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SELECTIONS

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NORTH-WESTERN PROVINCES.

Vol. III.

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SELECTIONS

FROM THE

RECORDS OF GOVERNMENT,

NORTH-WESTERN PROVINCES.

MISCELLANEOUS.

No. 1.

STATISTICAL MEMORANDUM ON THE RESOURCES OF THE MYNPOORIE DISTRICT IN 1849-50.

BY C. RAIKES, ESQ., C. S., *Collector of that Zillah.*

No. I.—*Letter No. 165, dated 4th April, 1851, from* W. MUIR, ESQ., C. S., *Secretary to the Sudder Board of Revenue, North-Western Provinces, to the address of* J. THORNTON, ESQ., C. S., *Secretary to the Government, North-Western Provinces.*

SIR,—Among the reports submitted by the Commissioner of Agra, with his address upon the Revenue Administration for the year 1849-50, the Board find an interesting memorandum on the resources of the Mynpoorie district, prepared by Mr. C. Raikes. It occurs to them that His Honor may feel interested in this memorandum; for, though perhaps not in all respects correct, it is founded upon an ingenious mode of calculation, and exhibits the result of considerable investigation and deduction.

I have, &c.,
W. MUIR,
Secretary.

SUDDER BOARD OF REVENUE,
N. W. PROVINCES:
Agra, 4th April, 1851.

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No. II.—*Memorandum by* Mr. Raikes, *on the Resources of Mynpoorie.*

1. I am going to hazard a few remarks,—*first,* on the pecuniary resources of the agricultural population of the Mynpoorie district; *secondly,* on the value of the gross produce of the land.

2. I will try first to show whence the producers get the money with which to pay their land tax, and to purchase clothes, utensils and other necessaries.

3. To do this, I shall take as my guide the annexed table of stock and produce sold at the new gunj at Sirsa during the past year.

4. This gunj absorbs the greater part of the traffic in live-stock and produce of the Shekoabad pergunnah, and, after some enquiry, I believe I may say that the trade at the gunj represents the average amount of traffic in a tract of 1,13,000 acres of (malgoozaree) land.

5. The cattle-dealers take a larger amount of money in the course of the year than all the other dealers put together. But as this trade is mostly between the agricultural producers of the district, who buy from and sell to one another, as may suit their necessities, not much money is got in this way.

6. We must look, then, to the other market transactions, which may be put down thus:—

	Rs.	As.	P.
1st.—District produce sold for export, such as wheat, gram, goor, &c.,	1,12,553	0	0
2nd.—District produce sold for district consumption, ...	1,14,165	0	0
3rd.—Import from other districts sold for exportation, being goor, ...	67,570	0	0
4th.—Imports from other districts sold for district consumption, salt, potatoes, grass, &c., ...	29,286	0	0
Proceeding on these data, Rs.	3,23,574	0	0

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7. The amount sold for exportation and for district consumption, representing so far the amount of money taken by producers from non-producers, may be estimated thus for the whole district in round numbers:—

Exports, ...	Rs.	8,35,000	0	0
Produce sold for district consumption,	„	8,40,000	0	0
TOTAL,	Rs.	16,75,000	0	0

8. It is not easy to ascertain the amount taken in return for the produce sold direct to travellers and others, exclusive of that which passes through the larger marts. In the margin I give a note of the traffic, by wheeled carriages only, through the town of Mynpoorie *towards* Agra during the past year.

	22,913	Carts of 2 Bullocks.
	12,537	ditto of 3 ditto.
	2,153	ditto of 4 ditto.
	1,063	ditto of 5 ditto.
	265	ditto of 6 ditto.
	48	ditto of 7 ditto.
TOTAL,	38,974	Carts.
„	99,255	Bullocks.

9. I cannot estimate the value of produce consumed by travellers and their cattle passing through the district at less than Rs. 2,20,000 per annum, and most of this money finds its way to the agricultural producers. This class also benefits very largely by the expenditure of the State and public departments, which for the past year has amounted to no less than Rs. 6,80,838-8-4½*, or about half the sum taken in Land

	Rs.	*As.*	*P.*
Revenue Pay Abstract and Contingencies, ...	93,975	0	7¼
Judicial ditto ditto, ...	1,51,446	14	2¼
Pensions, ...	4,051	14	4
Military Pay Bills, ...	87,501	14	8
Bills drawn by Military Officers in charge of Treasuries, ...	27,297	9	7
Ditto ditto by Political ditto, ...	2,603	11	10
Ditto ditto by Revenue ditto, ...	1,83,147	12	8¼
Assignments drawn in favor of Officers of the Department of Public Works and Ganges Canal, ...	1,06,471	14	3
Post Office Department,	3,341	12	2
Road and Ferry Fund,	21,000	0	0
TOTAL, Rs.	* 6,80,838	8	4¼

Revenue and Excise from the district. Of this sum at least two-thirds go to the agricultural producers.

10. We may then put down the cash receipts of the agricultural population thus:—

I. District produce sold for home consumption, ...	Rs.	8,40,000
II. Ditto ditto, exportation, ...	„	8,35,000
III. Produce sold to petty traders, and retailed to travellers and others, ...	„	2,20,000
IV. Expended by Government,*	„	4,44,000
	Rs.	22,39,000

11. To this must be added the sums brought into the district by men of agricultural families returning from service in Foreign States; also the large sums given to the Chowhan Thakoors as dower of females taken in marriage from other districts; and we shall not be far wrong, if we estimate the coin actually touched by the agricultural producers of the district at Rs. 25,00,000.

12. Of this 12,65,953 goes to pay the Government Land Revenue, being, as we may expect, if my calculations are correct, about equal to the sum received for exports† and returned by the expenditure‡ in the district.

13. There remains a sum of cash in the hands of the cultivating and producing classes equal to about Rs. 12,34,047.

By the best calculation I can make, this may be thus disposed of:—

Salt imported, ...	Rs.	1,05,000
Brass utensils and hard-ware, ...	„	22,050
Iron, ...	„	43,750
Balance, ...	„	10,63,247
TOTAL,	Rs.	12,34,047

* About Rs. 2,20,713 is value of remittances made by Government Bills in favor of relations of Sepoys.

† Rs. 8,35,000. ‡ Rs. 4,44,000.

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This balance of Rs. 10,63,247 remains in the district to be turned over for cloth, &c.

14. Besides this amount of the circulating medium, the capital of the agricultural classes may be estimated :—

Cattle, ...	Rs.	37,14,000
Chattels, ...	„	2,20,500
	TOTAL, Rs.	39,34,500

15. The second question which I proposed to answer was as to the average amount of gross annual produce in the district.

16. Now in a tract which supports more than half a million of people to whom luxury is unknown, and probably not a thousand who do not live in a frugal manner, a tract which produces the necessaries of life in sufficient quantities for a people who import scarcely any foreign edible substance except salt, it is not difficult, if the amount of population be known, to ascertain what the minimum amount of produce in ordinary years must be.

17. The population of the Mynpoorie district is above 650,000. At an average rate of one-half seer of *grain* per head per diem, their consumption must be near thirty lacs of maunds per annum, the money value being, when grain is at 30 seer per rupee, Rs. 39,54,045.

18. The cattle in the district amounting, as may be easily shown, to at least* 619,000, consume each :—

* I assume the cattle at 619,000 *at least* for the following reasons :—There are 619,000 cultivated acres requiring for each 20 kutcha beegahs (equal to 4 acres) one pair of bullocks. Now most of these bullocks are bred in the district, and there must be a proportionate number of cows of which very few are killed or exported; add to these cows all buffaloes, male and female, and it is impossible to calculate the cattle lower than this :—

Bullocks	309,500
Cows and Buffaloes ...	309,500
	619,000

I propose to test the accuracy of this item by an actual enumeration of the cattle, which is being made.

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Grain, 5¼ chtks. per diem, worth	Rs. 4	0	0	per annum.
Bhoosa, 1 seer per diem, worth	„ 1	1	0	ditto.
Grass, ...	„ 0	15	0	ditto.
Average cost per head per annum,	6	0	0	

19. On these (very low) calculations, the money value of the produce of the land may be set down:—

Grain for human consumption, ...	Rs.	39,54,045
Grain for exportation, ...	„	8,35,000
Grain for cattle, ...	„	25,02,621
Bhoosa, straw and other fodder, ...	„	6,77,031
Grass and other spontaneous produce,	„	5,34,348
TOTAL,	Rs.	85,03,045

20. By this computation, the average yield of every cultivated acre is 350 seers of grain, and this is well known to be about the mark in this district.

21. I have put down these memoranda in the way of "guesses at truth," because I think that the gross produce of the land is generally much undervalued. The sum I have entered is doubtless below the truth, as I have put all my averages low. By the calculation as it stands, the Government demand in this district is only about one-seventh of the gross produce of the land in fair seasons.

C. RAIKES,
Collector.

MYNPOORIE COLLECTOR'S OFFICE:
The 16th July, 1850.

APPENDIX TO No. II. ON THE RESOURCES OF MYNPOORIE.

Detail of the money price in Rupees of produce sold at the new Gunj at Sirsa, in the district of Mynpoorie from the month of May, 1849, to April, 1850.

Wheat, ...	69,635	11	0	Dried Mangoes, ...	140	15	0
Rice, ...	18,996	12	0	Castor seed, ...	754	4	9
Gram, ...	9,103	7	6	Red Chillies, ...	396	0	0
Urhur, ...	5,347	7	0	Oil, ...	224	8	0
Barley, ...	10,500	4	6	Garlic, ...	4	0	0
Maash	4,119	9	0	Onions, ...	75	0	0
Goor, ...	101,055	0	9	Mowhooa, ...	169	12	0
Salt, ...	20,958	9	3	Jooar, ...	4,949	13	6
Moong	2,893	1	9	Bajra, ...	3,777	0	9
Surson, ...	5,474	9	0	Mussoor, ...	368	7	0
Sounf, ...	202	4	0	Paddy, ...	80	0	0
Dry Tobacco, ...	6,609	12	0	Cotton, ...	2,720	0	0
Smoking Tobacco,	5,850	0	0	Hemp, ...	4,806	0	0
Reeds, ...	4,542	0	0	Paddy, parched, ...	292	5	0
Poppy Seeds, ...	1,904	0	0	Singharah	4,808	0	0
Khullee, Sursoon,...	2,345	13	6	Ghee, ...	697	5	0
Pulse, ...	5,400	7	0	Moat, ...	433	0	0
Potatoes, ...	3,786	0	0	Charcoal, ...	400	0	0
Ban, Moonj, ...	1,896	0	0	Turmeric, ...	887	7	9
Cotton, Thread, ...	10,160	0	0	Coriander seed, ...	737	8	0
Raw Sugar, ...	3,320	12	0				
Cotton Seed, ...	2,949	8	0	TOTAL, ...	3,23,574	12	0

N. B.—Besides this, 113,048 heads of cattle; viz.

96,118 Bullocks,
4,580 Cows,
650 Female Buffaloes,
8,292 Male Ditto,
3,366 Sheep and Goats,
42 Tattoos,

were brought for sale, of which the estimated value of sales completed amount to Rs. 5,11,150.

C. RAIKES,
Collector.

MYNPOORIE COLLECTOR'S OFFICE:
The 16th July, 1850.

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No. 2.

BARILLA; THE ALKALINE PRODUCT OF THE SUJJEE PLANT.

Memorandum by Captain E. Robinson, *Superintendent of Bhutteeana, regarding the Sujjee Plant, and the preparation of Alkali therefrom.*

Sujjee, which is a preparation from a plant bearing the same name, is of three qualities.

The first is called the *Cho'a;* the second *Rooth'a;* and the third *Khará.* All three qualities are produced at the same time, and from essentially the same process of manufacture.

The plant is cut during the months of October, November, December and January. When cut, it is allowed to dry for twenty days, and then put into a pit about three feet deep and one yard in diameter; having an excavation at the bottom to admit of an earthen pot being placed in it. Into this is put an inverted *ghurra,* with an orifice, half an inch in diameter, at the top. The orifice is kept closed at the first. Into the pit is thrown a small quantity of the plant, and burnt, fresh plant being gradually thrown in to keep up a constant fire; and this method is pursued till the pit fills up. During this process a liquid matter exudes from the plant. As soon as this is observed, the orifice of the *ghurra* is opened, and then the liquid matter and ashes are stirred up together. A long stick, very pointed at the end, is held at the opening in the *ghurra,* so as to guide the liquid matter into the orifice. The liquid that passes into the *ghurra* is called the *Cho'a,* or *first* quality sujjee; that which remains over the pot, and under the ashes, is the *Rooth'a,* or *second* quality: and that on the surface of the pit is the *Khara Sujjee,* or *third* quality.

After the above process is completed, earth is thrown over the pit, and it is allowed to remain in this state for

four days, or for a longer period, till the sujjee hardens in the pit.

The plant oomes into blossom about the month of September, and is burnt when in flower. It is supposed that the liquid, which forms the sujjee of the first quality, is the produce of the flowers.

The plant springs up spontaneously, and thrives best on a hard and clayey soil.

The stems that have been cut away shoot out again in the rains, and by the cold season are again ready for cutting.

The plant is peculiarly susceptible to the influence of the winter rains; and, previous to manufacturing, if it is at all affected by the rains, the quality is generally deteriorated, and the yield from it is by no means remunerative.

Another great precaution necessary, is to cut a sufficient quantity of plant; for if, during the burning process, the supply should fail, and the fire be extinguished before the pit has filled, all the labour is lost.

The quantity of plant (and when in its green state) for one pit is estimated at from twenty to twenty-five maunds.

Sujjee is very extensively used in washing and dying cloth. It is also applied to injuries sustained by camels and horses, and I believe it is used to clarify goor and khand.

The sujjee of the first quality, or *Cho'a Sujjee,* is of a light red colour, and sells at the rate of two rupees per maund. The second, or *Rooth'a Sujjee,* is of a dark grayish colour, and sells at the rate of one rupee eight annas per maund; the third quality, or *Khara Sujjee,* is of a blackish colour, and sells at eight-and-a-half annas per maund.

The traffic in this article at times is very great, and large quantities are exported to Europe.

E. ROBINSON.

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No. II.—*Explanatory Note regarding the Sujjee plant and its Alkali.* By M. P. Edgeworth, Esq., C. S., *Commissioner of Mooltan.—Dated 31st March, 1852.*

The *Sujjee* is exactly the *Barilla* of commerce,—a carbonate of soda. It is produced in Spain from a plant extremely similar to that from which it is made here.* The latter is termed in this Division *khar*; or in Persian *ash khar*. The scientific name is *Coronylon Griffithii.*

The similar species is cultivated in Spain extensively; and, as the price in England is from £9 to £12 per ton, I have little doubt that it could be most profitably cultivated in the bare wastes of clay, otherwise absolutely profitless, so extensive both in Bhutteeana and the Punjab.

I have heard the plant producing the *Sujjee* called (by Europeans) Lahna, and I once made the same error myself; but the natives carefully distinguish between them; calling by the names of white and red lahna and lahni, other salsolaceous plants *not* used in the manufacture of *Sujjec*,—though I have little doubt that, with proper manipulation, they too, especially the lahni (*Suæda Molliflora*) would produce *Barilla*. There are many square miles densely covered with this last; whereas the *khar* is comparatively rare. Camels are ravenously fond of *khar*, and the great difficulty in the "Bar," or desert, is to keep the camels from destroying it. Large quantities are brought in green to the Mooltan market for camel's fodder.

M. P. EDGEWORTH.

* Barilla or Barilloe.—In various parts of Europe, especially in the Spanish seaports, and at Teneriffe, a fine soda is manufactured by burning some varieties of plants which grow near the seacoast, especially the *Salsola Soda*, and *Salicornia herbacea*. The soda thus procured is called *Barilla*, and still constitutes an important item in British trade. It is imported in hard porous masses of a speckled brown colour.—Ed. (*O'Shaughnessy's Man. of Chem.* and *Ure's Dict. of Chem.*)

No. 3.

ABSTRACT MEMORANDUM OF THE TRAFFIC AT SIRSAGUNJ, AND STATISTICAL ABSTRACT OF ZILLAH MYNPOORIE, FOR THE YEAR FROM MAY, 1850, TO APRIL, 1851.

Memorandum (dated 29th August, 1851). By C. RAIKES, ESQ., C. S., *Collector, Zillah Mynpoorie, on the Traffic at Sirsagunj in 1850-51, addressed to the Commissioner of the Agra Division.*

1. Last year I had the pleasure of laying before you a memorandum of the sale of agricultural and other produce at Sirsagunj, within the walls of the new gunj which I established in 1848, and in the prosperity of which I feel naturally much interested.

2. I beg herewith to hand you a Note *(Appendix A.)* of the sales reported within the past twelve months, and proceed to detail how these statistics have been obtained, in order that you may know what degree of confidence to place in the figures given.

3. The Gunj stands on about nine acres of ground, and is formed by four rows of shops, abutting on, and enclosed by, an outer wall. There are two entrances for carts, and a third smaller entrance for persons on foot. The cattle sales are carried on outside, on a level spot appointed for that purpose. All other sales go on inside. The sales are thus classed:—

1st.—Cattle and live-stock, ...	Rs. 66,786
2nd.—Produce brought for sale by dealers from a distance, ...	„ 5,16,605
3rd.—Sales of groceries, spices, manufactured articles, and retail sale of ordinary produce by resident-dealers, or petty artizans and traders from the neighbourhood, ...	„ 1,06,649
TOTAL,	Rs. 6,90,040

These returns are obtained thus:—Market days are on Monday and Thursday, and cattle and produce, brought from a distance, are sold only on those days. A *mohurrir* takes his station before noon at the cattle market, and stays there till night. He keeps a memorandum of all transactions, showing the name of seller and purchaser, and the price given. The purchasers are only too glad to avail themselves of this security against the purchase of stolen cattle. The dealers in produce bring their loads over-night, on Sunday and Wednesday, and usually sell all their produce on the spot. If any be left on their hands then, it is stored till next market day. A *mohurrir* is stationed on a spot commanding the entrances to the Gunj, who notes down the amount of produce brought by each dealer, and enters the same in a book kept for the purpose. The dealers declare the amount of each load; and that amount is entered without question. By applying the market price of the day to the amount of produce, the value of that produce is estimated. The sellers are an entirely different class to the purchasers, and are easily recognized by the market writers. No entry is made by the *mohurrir* of produce, except as it is brought in to be sold; and consequently goods once brought into the Gunj can hardly appear a second time in this account. This department of the accounts is simplified by the fact that sellers hardly ever fail to find a ready market at the Gunj for their grain; whereas intending purchasers often go away disappointed. Produce for sale is brought mostly from Rohilkund and the Doab, and comes in carts and on buffaloes. Produce sold, as most of it is, to cross the Jumna (which is only seven coss from the Gunj) is carried off on bullocks, ponies, donkeys,—seldom on buffaloes, and never on carts,—so that the market clerks have not much difficulty in recording what comes into the market, and run little chance of confounding it with produce brought for transport out of the market again. Thus, I believe

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the account of sales, effected by dealers from a distance, may be depended upon as correct.

4. The third class of sales are ascertained from the chowdrees of banyas, sweetmeat-sellers, small-ware dealers, spice sellers, &c. &c., twice a week. As the very dealers often cannot tell the exact amount of sales effected on any given day, these returns can only be considered as giving an approximation to the truth. Care has been taken to prevent produce, already exhibited under class second, finding its way into the accounts of this third class.

5. For the future I have directed enquiry to be made as to the *place* from which produce is brought for sale, as precise information on that point will be interesting.

6. So much for the new Gunj. I now pass on to ask your notice of the "*District Memorandum*" sent herewith, which is a sort of "*speculum gregis*" for the Revenue Officers of the district *(vide Appendix C.)*.

7. It shows at a glance all the most important revenue transactions of the past year, the amount of land now ascertained by the putwaree's statements to be under cultivation, the population, the amount of live-stock by enumeration during the year, and the number and description of the village schools. All these details are given for each pergunnah.

8. On referring to the returns of population, you will observe that there are 26,555 births reported for the year, of which 14,651 are boys, and 11,904 are girls. The deaths for the same period are 15,756, amongst which are 4,476 boys, and 3,986 girls.

9. The cattle given in the table are to be classed as follows; *viz.*:—

Elephants, ...	9
Camels, ...	612
Horses, ...	5,842
Mares, ...	4,374
Buffaloes and Bullocks used for the plough,	1,95,959

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Buffaloes and Bullocks used for carts,	...	35,714
Cows,	... ...	1,28,777
Cow Buffaloes,	... ...	1,10,911
Asses,	... ...	12,160
		4,94,358

10. Besides the larger cattle entered in the table, the sheep and goats are as follows :—.

Sheep,	... ...	93,566
Goats,	... ...	45,764
		1,39,330

Besides these, there are some 10,000 swine in the district; at the least, 2,290 having been counted in the Shekoabad pergunnah only.

11. In the last column but one is entered the produce of the cultivated land, estimated at the average rate given by a set of nineteen measurements and weighments of crops made by me, in small plots of ground, amounting to 28 acres in all, with as much care as possible, in various parts of the district during the late *rubbee* harvest.

12. The detail of these experiments is given in a separate memorandum (*Appendix B.*) The crops weighed and measured were middling ones, on ordinary land, and not in the best villages of the district, so as to show, if possible, a true average rate of produce.

13. It is to be remarked, on the one hand, that the grain produce of the *rubbee* crops is heavier than that of a similar average in the *khurreef* crop; and also it is to be remembered that the general crops of the district, this last *rubbee*, when the measurements were made, were better than average.

14. To set off against this, I may remark that the estimated out-turn of the year has been calculated by applying the average rate per acre to all the cultivated land, exclusive of fallows; and that nothing has been added for

the extensive tracts which are annually brought under *double* or *treble* crops.

15. The result gives (taking the selling-price of grain of all sorts to average one-and-a-half maund per rupee, and bhoosa eight maunds per rupee), the sum of Rs. 88,72,666, being Rs. 71,04,345 for 10,66,518 maunds of grain, and Rs. 17,68,321 for 1,41,46,570 maunds of bhoosa.

16. In the last column is entered the money-value of district produce, calculated to have been consumed by man and beast during the year. The rates at which the computations are made are as follow:—

Half seer of grain to each head of population per diem, at one maund per rupee, ...	32,84,149
4,94,358 cattle, at 6 Rs. per head per annum,	29,66,148
Add for 1,49,330 sheep, goats and swine at 8 annas per annum, ...	74,665
TOTAL, Rs.	63,24,962

17. If we compare the result given in paragraph 15 with the district *jumma*, which is Rs. 12,68,195, the opinion which I have before advanced, that the Government jumma is not more than one-seventh part of the gross produce of the land, seems to be fully borne out by actual observations. No allowance, you will observe, has been made for spontaneous produce.

18. The money-transactions for the past year, so far as payments from the Government Treasury are concerned, may be classed thus:—

Revenue Pay abstracts and contingencies,	92,699	15	11½
Judicial ditto, ...	1,49,661	8	1½
Pensions, ...	3,270	11	2
Military Bills, ...	99,292	1	8
Bills drawn by Military Officers in charge of Treasuries, ...	19,621	15	2
Bills drawn by Political Officers, ...	1,112	8	4

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Bills drawn by Revenue Officers, ...	1,25,768	9	11
Assignments drawn in favor of the Officers of the Departments of Public Works and Ganges Canal, ...	1,88,993	9	5
Bills of the Post-office Department, ...	2,772	8	0
Bills of Road and Ferry Funds, ...	22,668	0	8
TOTAL, Co.'s Rs. ...	7,05,861	8	5

19. The traffic on the Grand Trunk and Agra roads is as follows :—

From September to April, by actual enumeration.

				Bullocks.
1,148	Carts of	1	Bullock each, ...	1,148
21,505	" "	2	ditto, ...	43,010
13,059	" "	3	ditto, ...	39,177
10,957	" "	4	ditto, ...	43,828
4,269	" "	5	ditto, ...	21,345
1,953	" "	6	ditto, ...	11,518
941	" "	7	ditto, ...	6,587
117	" "	8	ditto, ...	936
53,949	Carts.		Bullocks, ...	1,67,549

Cattle, mostly with loads.

22,009	Bullocks.	3,511	Donkeys.
6,906	Buffaloes.	278	Elephants.
12,007	Camels.	1,411	Ponies, drawing (singly) ekkas, or two-wheeled carriages.
29,886	Ponies.		
70,808		5,200	TOTAL, ... 76,008

To this must be added the traffic from May to end of August, which passed before arrangements for recording such details had been completed.

20. One interesting fact remains to be noticed. Not only has the cultivation of the district increased from

6,18,918 acres, the area under cultivation in 1836-37, (the year before the famine), to 6,77,680 acres in the year under report, (which return is doubtless *below* the truth,) but after some observation and close enquiry I am able to state that the greatest comparative increase of cultivation is along the line of the Grand Trunk Road, and the great Agra Road—localities formerly shunned by cultivators as well as all other classes of people. Land has been in the greatest demand, and every sort of produce has risen in value along these lines of road, since the late measures for the protection of the people have been carefully enforced.

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APPENDIX A.

Detail *of the money-price in Rupees of produce sold at the new Gunj at Sirsa, in the district of Mynpoorie, from May, 1850, to April, 1851.*

Wheat, ...	Rs.	40,097	0	9
Rice, ...	„	37,758	1	7
Gram, ...	„	1,635	4	3
Urhur, ...	„	1,183	9	7
Maash, ...	„	2,265	13	3
Goor, ...	„	1,61,945	8	3
Salt, ...	„	1,18,131	13	4
Moong, ...	„	2,089	3	8
Surson, ...	„	4,503	13	0
Dry Tobacco,...	„	1,374	0	0
Smoking Tobacco, ...	„	3,132	0	0
Poppy Seed ...	„	964	5	9
Khullee, Surson,	„	2,229	10	9
Pulse, ...	„	4,715	2	2
Potatoes, ...	„	3,921	0	6
Ban, (Moonj,)...	„	1,246	4	0
Cotton Thread,	„	16,826	0	0
Raw Sugar, ...	„	7,173	8	3
Cotton Seed, ...	„	1,740	12	9
Castor Seed, ...	„	1,219	10	0
Red Chillies, ...	„	639	3	6
Oil, ...	„	514	0	0
Joar, ...	„	6,142	10	9
Bajra, ...	„	2,150	14	6
Mussoor, ...	„	777	4	7
Paddy, ...	„	176	8	0
Cotton with Seed,	„	884	8	0
Hemp, ...	„	5,795	14	0
Singhara, ...	„	6,320	0	9
Ghee, ...	„	6,208	8	0
Bajhur, (Barley and Gram mixed,) ...	„	2,756	12	5
Attah and Dall	„	3,365	0	0
Carried over,	Rs.	4,49,883	14	4

Brought forward,	Rs.	4,49,883	14	4
Churbun, ...	„	490	0	0
Sweetmeats, ...	„	266	0	0
Cotton, ...	„	71,133	0	0
Spices, ...	„	15,104	14	3
Vegetables, ...	„	2,159	8	0
Iron Materials,	„	1,331	0	0
Wooden Works,	„	1,138	0	0
Looking Glasses, &c. ...	„	910	8	0
Raw Silk, &c. ...	„	570	8	0
Needles, &c., ...	„	275	0	0
Lotahs, Thallees, ...	„	437	0	0
Earthen pots, &c.,	„	125	0	0
Nurree, or Shoe-leather, ...	„	401	0	0
Hides, ...	„	28,179	1	2
Shoes, ...	„	3,324	0	0
Cloth, ...	„	15,950	0	0
Goodur, or old clothes, ...	„	312	8	0
Pice, ...	„	23,187	0	0
Gold, ...	„	200	0	0
Meat, ...	„	55	0	0
Mats, ...	„	132	5	0
Paun, or Betel,	„	158	0	0
Baskets, ...	„	255	12	0
Brooms, ...	„	5,251	6	6
Mustard Seed,	„	448	0	0
Bullocks, ...	„	63,660	4	3
Cow, ...	„	1,287	13	3
Buffaloes, ...	„	2,493	2	0
Goats, Sheep, Horses and Asses, ...	„	647	7	6
Miscellaneous,	„	274	10	9
Total,	Rs.	6,90,040	11	0

APPENDIX B.

Table of average Produce per Acre, in Zillah Mynpoorie, 1850-51.

Tehseeldaree.	Wheat.			Barley.			Wheat Bhoosa.			Barley Bhoosa.			Pergunnah-war Average.			General Average per Acre.	
	Acre.	Grain.	Average.	Acre.	Grain.	Average.	Acre.	Bhoosa.	Average.	Acre.	Bhoosa.	Average.	Acre.	Grain.	Bhoosa.	Grain	Bhoosa.
		M. S. C.	M. S.		M. S. C.	M. S.		M. S. C.	M. S.		M. S. C.	M. S.		M. S. C.	M. S.	M. S. C	M. S. C.
Moostufabad, ...	9	181 0 12	20 4	5	104 15 0	20 35	9	249 34 0	27 30	5	120 21 8	24 4	1	20 15 0	26 18		
Shekoabad, ...	4	34 18 4	8 24	1	6 33 0	6 33	4	55 5 0	13 31	1	7 35 0	7 35	1	8 10 4	12 24		
Mynpoorie, ...	6	73 10 0	12 8	2	22 25 12	11 18	6	117 7 12	19 21	2	29 10 12	14 25	1	11 39 0	18 12		
Bhoegaon, ...	0	0 0 0	0 0	1	18 0 0	18 0	0	0 0 0	0 0	1	5 0 0	5 0	1	18 0 0	5 0		
Total, ...	19	288 29 0	15 8	9	151 33 12	16 35	19	422 6 12	22 8	9	162 27 4	18 3	0			15 29	20 35

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APPENDIX C.

STATISTICAL ABSTRACT OF THE MYNPOORIE DISTRICT, A. D. 1850-51.

PART I.—*The Land and its Management.*

Tehseel	Tehseeldaree and Pergunnah.	Number of Mehals.	Malgoozaree area.	Cultivated area in Acres.	Revenue demand of 1850-51. Rs.	A.P.	Collections. Mal. Rs.	A.P.	Abkaree. Rs.	A.P.	Total. Rs.	A.P.	Dustucks issued.	Puttees transferred.	Estates farmed.	Estates brought under kham management.	Sales on account Revenue Balances.	Sales on account decrees of Courts.	Summary Suits.	Cases of Mutation.	Partitions.
	Shekoabad, ...	180	1,13,119	1,05,911	2,23,006	0 0	2,22,921	0 0	3,344	0 0	2,26,265	0 0	917	3	0	0	0	6	119	34	3
	Moostufabad,	203	1,22,540	1,09,747	2,66,846	0 0	2,65,619	0 0	1,896	0 0	2,67,515	0 0	667	0	0	0	0	5	71	36	6
Tehseel Eytah.	Sahawur Kursana, ...	123	62,680	53,970	63,633	0 0	63,633	0 0	1,961	0 0	65,594	0 0	132	0	0	0	0	0	90	27	1
	Sirpoorah, ...	96	48,652	36,154	35,627	0 0	35,627	0 0	767	0 0	36,394	0 0	85	0	0	0	0	1	38	17	5
	Sukeet, ...	129	47,913	40,949	70,227	0 0	70,222	0 0	1,973	0 0	72,196	0 0	75	0	0	0	0	0	62	11	1
	Eytah, ...	139	38,195	35,909	64,013	0 0	63,929	0 0	1,633	0 0	65,562	0 0	198	0	1	0	0	7	88	44	0
	Sonhar, ...	32	15,471	13,098	13,234	0 0	13,163	0 0	528	0 0	13,691	0 0	62	0	0	0	0	0	30	8	1
Tehseel Ghurour.	Ghurour, ...	57	45,208	36,393	87,637	0 0	87,043	0 0	1,090	0 0	88,133	0 0	288	0	0	0	0	2	55	12	2
	Kurhul, ...	58	27,013	23,923	58,998	0 0	58,998	0 0	1,243	0 0	60,241	0 0	255	2	0	0	0	1	29	10	1
	Souj, ...	38	35,161	24,858	61,147	0 0	61,087	0 0	520	0 0	61,607	0 0	292	0	0	0	0	0	53	6	0
	Korrowlee, ...	42	31,427	24,621	32,856	0 0	32,856	0 0	2,042	0 0	34,898	0 0	199	0	0	0	0	0	17	9	1
Huzoor Tehseel.	Munchunna,...	152	72,742	60,155	1,02,757	0 0	1,02,433	0 0	9,974	0 0	1,12,407	0 0	676	0	0	0	0	5	131	25	4
	Kishnee Nubeegunj, ...	41	36,074	30,023	62,734	0 0	6,27,256	0 0	2,552	0 0	65,278	0 0	451	3	0	0	0	1	31	8	0
	Aleepoor Puttee, ...	22	14,576	11,651	18,696	0 0	18,696	0 0	1,193	0 0	19,894	0 0	114	0	0	0	0	0	16	4	2
	Bhoegaon, ...	101	61,176	51,208	87,478	0 0	87,463	0 0	4,287	0 0	91,750	0 0	473	0	0	0	0	2	89	0	2
	Bewur, ...	41	22,289	19,110	19,306	0 0	19,304	0 0	1,182	0 0	20,486	0 0	223	0	0	0	0	1	12	20	0
	TOTAL, ...	1,459	794,236	6,77,680	12,68,195	0 0	12,65,721	0 0	36,190	0 0	13,01,911	0 0	5,117	8	1	0	0	31	931	311	29

APPENDIX C.—(Continued.)

PART II.—*Population, Cattle and Produce.*

	Tehseeldaree and Pergunnah.	Population.										Schools.			Cattle.	Value of produce at the rate of 629 seers grain, and 835 seers Bhoosa per acre.	Produce consumed by Cattle and Population.
		Population.				*Births.*		*Deaths.*									
		Males.	Females.	Boys.	Girls.	Boys.	Girls.	Males.	Females.	Boys.	Girls.	Arabic.	Persian.	Sanscrit and Hindee.		R. A. P.	R. A. P.
	Shekoabad, ...	37,280	33,338	22,315	14,643	2,127	1,789	570	443	705	538	1	21	26	59,473	13,86,661 0 0	8,40,930 0 0
	Moostufabad, ...	42,011	34,466	27,519	16,658	1,900	1,569	520	449	802	676	0	9	17	78,722	14,36,885 0 0	10,15,275 0 0
Tehseel Eytah.	Sahawur Kursana, ...	15,249	12,861	8,948	5,977	651	555	130	232	423	403	0	11	4	27,962	7,06,613 0 0	3,61,430 0 0
	Sirpoorah, ...	10,012	7,690	4,806	3,235	371	278	72	62	77	86	0	2	1	21,946	4,73,353 0 0	2,47,519 0 0
	Sukeet, ...	15,629	12,693	7,548	5,076	520	414	112	81	171	142	0	10	7	28,435	5,36,133 0 0	3,54,880 0 0
	Eytah, ...	15,374	12,955	9,402	6,199	826	585	139	112	249	183	0	2	10	30,893	4,70,147 0 0	3,83,043 0 0
	Sonhar, ...	3,901	2,963	1,964	1,238	138	79	17	13	17	12	0	1	2	8,363	1,71,489 0 0	95,489 0 0
Tehseel Ghurour.	Ghurour, ...	16,821	13,295	10,078	6,200	956	923	388	385	362	279	0	2	4	34,821	4,76,483 0 0	4,17,699 0 0
	Kurhul, ...	10,812	8,872	6,524	4,223	863	856	169	218	273	151	0	1	9	20,798	3,13,217 0 0	2,61,727 0 0
	Souj, ...	11,789	9,940	7,614	4,173	830	673	159	162	157	107	0	5	8	26,050	3,25,459 0 0	3,07,122 0 0
	Koorowlee, ...	9,15)	8,015	5,876	3,793	563	423	104	101	116	95	0	6	6	20,239	3,22,355 0 0	2,42,547 0 0
Huzoor Tehseel.	Munchuna, ...	31,355	28,234	14,937	10,429	1,55)	1,381	586	458	422	470	2	12	13	45,367	7,87,592 0 0	6,54,500 0 0
	Kishnee Nubeegunj, ...	12,832	10.777	7,241	4,882	740	689	200	152	108	93	0	5	7	28,918	3,93,082 0 0	3,34,302 0 0
	Aleepoor Puttee	3,857	3,444	2,475	1,720	538	462	145	74	88	81	0	2	3	8,710	1.52,543 0 0	1,03,992 0 0
	Bhoegaon, ...	20,615	17,701	10,242	7,735	1 85)	1,224	539	398	477	621	0	12	7	42,681	6,70,452 0 0	5,09,409 0 0
	Bewur, ...	4,530	3,568	2,5ɔ7	1,508	128	96	41	33	32	19	0	1	5	10,92ɔ	2,50,202 0 0	1,20,438 0 0
	TOTAL, ...	2,61,217	2,2),818	1,50,086	97,690	14,651	11,904	3,891	3,403	4,476	3,986	3	102	129	4,94,358	88,72,666 0 0	62,50,297 0 0

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No. 4.

IRON AND COPPER MINES IN THE KUMAON DIVISION.

REPORT *dated 31st January, 1850, by* J. O'B. BECKETT, ESQ., *Deputy Collector, on the Iron Mines of Puttee Gowar, in Zillah Kumaon, and on the Iron and Copper Mines of Puttee Lobah, in Zillah Gurhwal.*

On the real or probable extent, and real value of the ferruginous deposits of the Khetsaree district.

THE valley in which the iron ore is procured runs nearly north and south, and extends from Dorahath on the south, to Pundooa Khal on the north. It is formed by two rivers, the Kotelar and the Khetsaree, the former running north, and the latter southward, both being terminated by the valley of the Ramgunga, which crosses them at right angles; thus making the Kotelar valley about nine miles long, and the Khetsaree valley about six miles. The range of hills on the east side of the valley is where the ferruginous deposit lies; the dip of the strata being to the north-east, as near as I could guess.

The following is a table showing the number of mines worked at the present day, with the workmen employed in them:

MINE.	*Mining.*	*Smelting.*		*Refining.*		REMARKS.
	Families.	Families.	Forges.	Families.	Forges.	
Chitalee, ...	7	6	2	9	3	In the Kotelar valley, 3 miles from Dorahath.
Sirolee, ...	27	15	7	27	8	In do. do., 6 do. do.
Burrulganoo, Godee, ...	68	50	18	83	22	At the end of the Kotelar valley, above the river Ramgunga, between the rivers Kotelar and Terakee Tal.
Boneegarh, Khetsaree,	29	38	8	20	7	In the Khetsaree valley, 5 miles from Pundooa Khal.
Simul-khet, ...	56	58	19	117	29	At the head of the Khetsaree valley.
				12	12	At Hathkubron, valley of the Ramgunga.
				2	2	At Nagar, do. do.
				2	2	At Mehelchoree, do. Kotelar.
				1	1	At Ghunseearee, do. do.
7 Mines, ...	187	167	54	273	86	or Total 627 Families and 140 Forges.

In the foregoing statement is included the mine of Simul-khet, which, although the revenue of it is included in the Gurhwal assessment, yet is itself situate within the Kumaon boundary. The reason of this appears to be, because the Gurhwal mines of Kaleemathee and Mehelchoree are included in the same grant. The former of these two is not now worked, as in the severe winter of 1846 the works were covered with snow. The latter also is closed, owing to the produce of the ore, which is of specular iron, proving, under the native treatment, too brittle and hard to work.

An insufficiency of workmen may also be assigned as a reason for these two mines being shut. This is principally owing to the workmen having found employment in cultivating the Terai, and also in building houses, &c. at Nynee Tal.

The Simul-khet mine being the largest, and the only one in full work at the time of my visit, was fixed upon by me for examination as to the mode of working and treatment of the ores. It has four entrances, all horizontal, and the workings have penetrated 350 feet into the bowels of the mountain. The ore, hematite or red oxide of iron, is disposed in veins in a gangue of clay slate, itself highly impregnated with iron. The direction of the lode is very various; at one time lying at an angle of 30° above the horizon; at another time as much as 90° below it. Its general tendency is, however, a slope of about 25° below the horizon. The veins are very brachiose, and vary considerably in breadth and thickness, ranging from 3 to 18 feet wide, and from 2½ to 15 feet high. The generality seem however to be from 3 to 5 feet wide, by from 4 to 6 feet thick.

Should a rupture or slip occur in the vein, the miners suppose it to be terminated, and consequently leave off working it. The workings are perfectly dry. Were it not so, it would lead to the abandonment of the mine, as the

workmen are totally ignorant of the construction or working of any hydraulic engine, and the expense of cutting low level adits precludes their construction. Another fortunate circumstance is, that owing to the solid nature of the rock, cracks of the roof are of rare occurrence; consequently little or no supports are required for the roof in the whole of the Simul-khet mine; only four or five small trees having been used for that purpose.

The extent of the deposit may be stated as included in a range of hills thirteen miles long; but any further statement would be merely hypothetical, and unless made by an experienced "viewer," little credence could be attached thereto.

The quality of the ore is good; but being without any means or appliances for testing the true per-centage of iron in the ore, I cannot say what its exact richness may be. Dr. Ure, in his "Encyclopædia of Arts and Manufactures," states that the red hematite usually contains 70 per cent., and the specular iron ore 80 per cent. of pure iron, but as the native workmen do not extract 9 per cent., it is not possible that the ore contains anything like 70 per cent. It is more probable that his per-centage refers only to the red powder or pure oxide, which is the prevailing feature of the ore, as taken out of the mine.

SECTION II.—*On the economy and distribution of labour in the treatment of the Ore.*

In this may be comprised seven distinct heads; viz.—

1st. Operations of the miner, or *Sone.*
2nd ——— of the smelter, or *Dhunuriya.*
3rd. ——— of the refiner, or *Khutouniya.*
4th. Tax levied on each of the three classes of workmen by the lessee of the mines.
5th. The share appointed to each class.
6th. Produce of iron from a given quantity of ore.
7th. Manufacture of the charcoal.

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FIRST HEAD:—*Operations of the Miner.*

The instruments in use by the *Sone*, or miner, consist of a small pick, a *gad* or wedge to drive into crevices or holes made by the pick, and a hammer to drive in the *gad*, and also to break off projecting pieces. Of each of these three, there are several varieties, differing from each other only in size. They are all made of iron; steel not being procurable in the district, which is the cause of much expense from the frequent breakage of the picks and *gads*. The rubbish is dragged out of the mine in a barrow of the most primitive construction, consisting merely of a dried cow's hide, with a rope and cross handle attached to the neck, by which it is dragged along by two men.

The miners work during the day, rarely if ever at night, and can manage in one day to dig out from 8 to 12 maunds of ore, which is carried from the mouth of the mine principally by women, in baskets containing from 20 to 30 seers.

The only lights used are torches made of dry fir; but I am informed that, when the assessment was lighter, oil was used, but that on its being increased to its present rate, the use of oil was discontinued as being too expensive.

The ore or *dhoon* is collected in heaps before the miner's dwelling, and is by his family broken into small pieces, about the size of a larger filbert, preparatory to its being delivered over to the smelter. All the dust resulting from the operation of breaking, instead of being preserved as the richest portion of the ore, is allowed to lie on the ground as useless,—a most notable waste thereby ensuing.

SECOND HEAD:—*Operations of the Smelter.*

The furnace of the smelter is of a very simple construction, its extreme length being 3¼ feet by 2¼ feet broad, made of common stone, and clay faced with slabs of quartoze-schist, luted with a compost of chaff and clay; and the ashpit is about 6 inches square. But, as the shape of the whole is very irregular, I have made a plan of it, as being more easily comprehended than any description I could

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give; for which see *Sketches A and B.** The furnace is built inside a house, 12 × 14 feet, of which the roof is composed of loose planks.

The operation generally takes about 28½ hours; that is to say, the fire is kept up during that time; and after every such period the facing slabs and luting require renewing. The tools required consist of a crow-bar of five feet, and a poker of six feet length; also a shovel, with a pair of bellows made of buffaloe hides, dressed whole, the neck forming the nozzle, and the buttock the valve for the ingress of air. These are the only expensive articles in use, the hides costing about 12 Rs. each, and two or three days' labor, or preparing them by rubbing with oil to prevent their cracking.

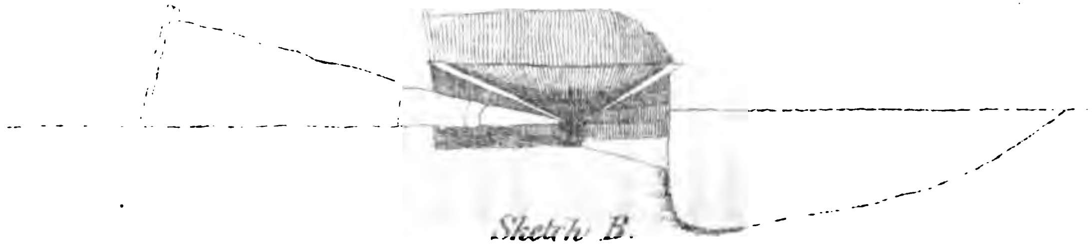
The furnace being freshly luted in all parts, the ashpit is filled with chaff and charcoal dust, and a fire being lit thereon, six baskets of ore, each containing about 30 seers, are placed round the fire, on the semi-circular part of the furnace, till the whole assumes somewhat the appearance of the cone of a volcano. The blast is now commenced, and is urged on without intermission during the whole operation; one bellows undergoing depletion, while the other is inflated. Thus a tolerably continuous blast is produced. In about half an hour the slag begins to flow out of the floss-hole, which, during the operation, requires to be kept open from time to time by the poker. In about two more hours the ore having greatly subsided, two more baskets of ore are added, and in another two hours (the fresh supply having also subsided, and a blue flame beginning to play on what still remains) the charge is deemed ready. The fire is therefore raked out through the floss-hole, and the charge, consisting of a pasty mass called *phulka* or *jhauj*, (resembling in shape an egg, with the thick end cut off, and wanting about one-sixth of its circumference) is taken out, or rather shoved out by a

* *Vide* Appendix.

KUMAON FURNACE, FOR SMELTING IRON ORE.

Sketch A.

Vertical Section, from the front



Sketch B.

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crowbar. More fuel is then introduced with three baskets of ore, and this charge heated as the former, two more baskets of ore being thrown on as before. Thus the operation proceeds till seven blooms have been procured. The ore remaining is then raked out, and the operation is at an end; having consumed 38 baskets of ore, 31 of which are represented by the seven blooms, and the other seven by that which remains. These last seven consist of ore partially roasted, which becomes the property of the smelter.

The quantity of charcoal consumed is about 340 seers, or rather more than the weight of the seven blooms, which weigh 327½ seers, or about one-third of the ore expended.

I omitted to mention that, as each bloom is taken out, the ashpit is re-filled with charcoal dust, and a new clay nozzle for the bellows luted in.

Each bloom consists of three qualities of metal, all intermixed with earthy particles; the lower part being the richest in iron, the upper part the poorest, and the middle part of intermediate quality.

THIRD HEAD:—*Operations of the Refiner.*

The three qualities of the bloom are kept separate from each other, and the third quality is broken into small pieces, the size of a bean, and the other two qualities into pieces of three or four ounces weight.

The furnace is not so large as that used by the smelter, and is unlike it in not having the semi-circular part. In other respects it is exactly the same. The tools required are a pair of pincers, a poker, and two or three sledge hammers; also an anvil. The bellows are the same as those used by the smelter, but the blast is not kept up so strong as in the smelting operation.

The fire being lit, a mixture of one-sixth of first quality, one-sixth of second quality, and the remaining two-thirds of third quality, in all about six seers of bloom metal, is placed on the hearth opposite the bellows, with the larger

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pieces nearest the fire. The blast being commenced, in a quarter of an hour the slag begins to flow; and in another quarter of an hour, the metal (now a porous, pasty mass) is taken out of the fire, and subjected to the blows of two or more sledge hammers, the blows being slight at first, to prevent the metal flying into pieces, but as it becomes more solid, they are given with the full force of the workmen. Meanwhile a fresh supply of bloom-metal is placed on the hearth, as at first. The hammered mass, after several heatings and hammerings, assumes the shape of a small bar, weighing one and a quarter seer thick in the middle, and tapering to either extremity, six seers of charcoal having been used in its formation. This bar is now fit for the market, and is called by the workmen *phala*, but by the plains-people *pyn*.

The charcoal used by the refiner is made from the dry trunks of fir trees, which have been felled for two or more years; while that made use of by the smelter is made from small green wood.

The refiner class is sub-divided into another, called *Bhudeliya*, who, instead of making the iron into bars, manufacture it at once into cooking utensils.

FOURTH HEAD:—*Taxes levied on the manufacture.*

The mines are leased for a term of years to contractors for a certain sum, and the lessee collects for the season from the different classes of workmen at the following rates, which I believe were made out by Mr. Commissioner G. Traill:—

	Rs.	A.	P.
From each *Sone*, ...	2	8	0
From each party of smelters, ...	4	8	0
From ditto of refiners of the Khutouniya class,	4	8	0
From ditto ditto of the Bhudeliya class, ...	6	0	0

FIFTH HEAD:—*Share of each class.*

The miner is originally sole proprietor of the ore, which he takes to the smelter to reduce into blooms, giving him for his trouble one basket of ore (30 seers), and one basket

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of charcoal (5 seers) for each bloom turned out; also, for each set of 7 blooms, 16 seers of grain, and food for one man for four days; and at the end of the season a suit of clothes. Sometimes, however, owing to the smelter being largely in debt to the miner, he does not receive any charcoal from him.

The smelter can only work for certain miners, generally five in number, not being allowed to work for any other miners; or, in other words, each party of five miners employ one family of smelters exclusively. Each party of smelters must consist of at least five persons, but they generally count eight to ten persons.

The share of each party of refiners is 50 per cent., or half of the bloom-metal made over to them to refine, no further items being allowed them. Refiners, unlike the smelters, are not bound to work for any particular person, but may work for any one that chooses to patronize them.

SIXTH HEAD:—*Economy of the manufacture.*

I witnessed the whole of two operations from beginning to end, carefully measuring the quantities of ore and charcoal used, and their produce, and have taken the most favorable of the two results as the general average; several reasons, such as an old furnace and old pair of bellows causing one of the results to be below the general average. To guard against any deception being practised for the sake of misleading me, I frequently visited casually other forge where the same operations were going on. The workmen themselves never go to the trouble of measuring exactly either the ore or charcoal; so at one time more ore is used, at other times less, but the result is just the same, as the produce varies in the same proportion.

Of ore, 930 seers produce 327¼ seers of bloom-metal, which in its turn produces 81¾ seers of marketable bar iron; the proportion is therefore 930 seers of ore to 81¾ seers of iron; or in other words, the produce of 100 parts of ore is nearly 8⅘th parts of iron,—a truly miserable result!

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Again, with respect to the expenditure of the charcoal, 930 seers of ore require 340 seers of charcoal to produce 327½ seers of bloom-metal, which in its turn requires 327 seers of charcoal to produce 81¾ seers of iron; that is, to produce 81¾ seers of iron, 667 seers of charcoal are required; or for every seer of iron about 8⅛ seers of charcoal,—a most enormous amount, considering that the *best* European method (the Swedish forge) only requires 1⅓ seers of charcoal for one seer of iron, and the worst method (the Catalan forge of the Pyrenees) expends seven times the weight of the ore. The whole of the native system slightly resembles that of the Catalan forge.

SEVENTH HEAD:—*Manufacture of Charcoal.*

As before stated, two kinds of charcoal are used.

That used by the smelter is made from the branches of every kind of tree; also from shrubs and the lops of fir trees. These being cut in pieces, four feet long, are piled crossways horizontally in the open air to a height of six or seven feet, a space being left in the centre of the bottom rows for a wood-fire, which being lit, the whole pile is gradually kindled. From the green state of the wood, however, so much flame is not generated as the exposure to the air might lead one to suppose. Still the loss must be very great both in weight and quantity. When the wood is sufficiently charred, it is extinguished with earth, if water be not procurable.

The charcoal used by the refiner is made from the dry trunks of fir trees, which are split into logs six or eight feet long. Its manufacture is the same as that of the other, except that the logs are placed slanting upwards, instead of in a horizontal position. The waste is however much greater, as owing to the dry state of the wood, all the outer parts are burnt into ashes.

Nearly equal quantities of each of the two kinds are used in the manufacture of a given quantity of ore. Now as the trunk of a fir tree contains a much larger quantity

of wood than the top and branches of it, it would follow that a number of trees would be cut solely for the top and branches, but the deficiency in the first case is nearly, if not more than counterbalanced by the first quality charcoal being also made from shrubs, and the branches of other trees, and also by the excess of loss in the manufacture of the second quality.

SECTION III.—*On the exact distance, character, quality and extent of the forests; with their future capabilities under the present carbonari systems.*

TO THE EASTWARD.

The forests extend from Mehelchoree to the mouth of the river flowing from Terakee Tal, including the hills forming the valley of Toleegurh, which is about 20 miles long. In this direction the forests are very extensive, covering the hills from their summits to the valley of the Ramgunga at their foot; for no cuttings of any consequence have taken place in the Toleegurh, owing, I conjecture, to the steepness of the hills, it being a remarkable fact that, rather than go for wood up a steep ascent near them, the charcoal-burners will go a distance of three or four miles, where the road may be comparatively level. The western face however of the hill separating the Toleegurh from the Khetsaree valley in the immediate vicinity of the mines is, with the exception of the summits, completely cleared of large timber; but in its place is springing up a jungle of shrubs and small trees, which, as fast as it is cut down, springs up again, thus furnishing a continuous supply for the first quality charcoal.

TO THE SOUTHWARD.

The forests extend from the mouth of the Terakee Tal river to the mouth of the Kotelar river, including the lake district; and the western face of the hills, compos-

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ing the Kotelar valley, forming a district of the following dimensions :—Greatest breadth 2½ miles, least breadth 1½ mile; greatest length 7 miles, lesser length 6 miles. For the better description of the cuttings in this portion, I have found it necessary to divide it into three parts;—

Firstly, the western face of the hills composing the Kotelar valley.

The western face of the north spurs of Doonagiri at the present day has very little wood on it, with the exception of the summits of the hills, and a small quantity at their southern extremity. Four mines being situated on the slopes sufficiently account for this. Brushwood is however tolerably abundant.

Secondly, the slopes of the hills on either side the Tarakee Tal river.

The hills below Terakee Tal form a division about two miles and a half long, of which a mile and three-quarters of the northern part is (with the exception of the summits of the hills) quite clear of everything but brushwood. The upper three-fourths of a mile contain deep glens, which are very thickly wooded with fir; very slight impression having been made by the cuttings hitherto.

Thirdly, the hills above and about the Lake

In this division cuttings are going on, but although about 1,000 trees may be lying on the ground, yet this is a mere nothing to the immense forests which exist in this direction.

TO THE WESTWARD.

The hills forming the western side of the Kotelar valley consist of small spurs running down from the Nugurjoon range. The spurs themselves are devoid of large trees, but are thinly covered with brushwood and young fir trees, which latter are springing up very numerously, though at present they are not more than four feet high on an

average. The Nugurjoon range is itself well wooded for a distance of eleven miles in length, no very large cuttings having as yet taken place. On the western side of the Khetsaree valley there are three low ranges of hills about five miles long, running parallel to the Khetsaree river, and lying between it and the great Jorassee range. These are completely denuded of all but brushwood and a rising generation of fir, at present not three feet high. The Jorassee range, on its eastern face, is more than two-thirds cleared of wood, but the western face is still covered with extensive forests. On this range cultivation keeps pace with the cuttings; or, in the words of a zemindar, (the principal proprietor there,) as soon as a nice piece of land is cleared, it is taken into cultivation.

TO THE NORTHWARD.

This division lies within the Gurhwal territories, and consists of,—*first*, the spur of the Beansee hill, running parallel with, and forming the east bank of the Ramgunga; and *secondly*, the several spurs of the Dudertoli mountain, including the hills on the banks of the Meigudh, and those on the left bank of the Ramgunga.

The spur of Beansee, in addition to some oak, is about two-thirds covered with fir forest for a distance of about four miles. Small cuttings took place here a few years ago, but a wish having been expressed by both the late and present Commissioner to preserve the wood, further cuttings have not taken place.

Dutertoli, with its spurs to within three miles of Simulkhet and Doorgadhee, is clothed with dense forests of oak, at present not used by the charcoal burners on account of its hardness; but from where the oak ceases, the forest is composed of fir; all of this, however, within a demi-semicircle of three miles from Simulkhet is cut. A good deal of the trunk timber still strews the ground, and is now being used. The portion beyond this, three miles, is

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still covered with forest. Large cuttings are however daily taking place.

Lastly, it is impossible to form even a conjecture as to how long the present forests will last, there being no data procurable as to how much charcoal is wasted and consumed yearly; but as some of the mines have been worked for more than 35 years, and a space of about only sixteen miles long, by from one to three miles broad, has been cleared of large timber, there need exist no apprehensions of the supply failing within at least three generations, not including any of the oak forests in the above conjecture.

The following is a statement of the distance from each of the mines to where the charcoal burners go for their charcoal:—

Mines "Chitalee" and "Sirolee" are supplied with charcoal at a distance of about one mile or less from the Nugurjoon range of hills.

Mines "Burrulganoo" and "Godee" are supplied from the bend of the Jorassee range at Jorassee, a distance of three miles; and from the Terakee Tal district, varying from two to four miles in distance.

Mines "Boneegarh," "Khetsaree" and "Simulkhet," from the Jorassee range and the spurs of Dudertoli, varying in distance from three to five miles. A great deal of the green wood charcoal is however collected in the immediate vicinity of all the mines.

SECTION IV.—*The probable extent and value of the cupriferous deposit at Ajurseera, with the economy of the manufacture of the copper from the ore.*

The mine of Ajurseera is situated about three miles from the Lobha bungalow, and has been worked, with occasional interruptions, from time immemorial. The entrance of the mine is in the face of a perpendicular rock of white quartz on the left bank of the Ramgunga. The

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ore is, I believe, a sulphuret, and occurs in thin veins about ten feet broad, but of no material thickness. The gangue consists of white and yellow quartz, which is also much covered with the green carbonate of copper; the dip of the strata appearing to be about 30° below the horizon, with a north-westerly direction. The stone being very difficult to work, the produce of one man's labour varies from 20 to 30 seers a day. The excavation is perfectly dry, requiring no drainage.

The ore, when brought into the open air, is broken small, in fact almost pounded, and when about to be smelted, is moistened with water, and mixed with limestone, as a flux, in the proportion of five of the latter to six of ore. The charge consisting of three seers of (unmixed) ore takes about half an hour to smelt, and is placed from time to time in handfuls on the top of the fire, and covered with oak charcoal, which is also occasionally sprinkled with water. When the fire falls in after the last supply of ore, the charge is ready to be taken out. The door of the furnace is therefore taken away, and the remains of the fire being raked out, there appears at the bottom a melted mass, which, after being stirred about a minute or two, to allow the heavier particles to settle down, is sprinkled with water, which causes the upper surface to harden into a clinker. Three or four of these being taken away, the melted copper is found at the bottom, in a small mass weighing 7 tolas; six seers of charcoal having been expended.

The economy of the manufacture is therefore as follows:—From every 100 parts of ore 2¼½th parts of copper are procured, having consumed 200 parts of charcoal; or, in other words, 68½ seers of charcoal are required for the production of one seer of pure copper.

The furnace is about one foot in depth, and resembles in shape an egg, with the thick end downwards, and the small end cut off, the door being formed on one side; with the exception of which the whole is sunk in the ground. The

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blast employed is that resulting from two great skin bellows worked by two persons. They are placed on a level with the top of the furnace, but have their nozzles so bent as to deliver the blast at the bottom of it.

The whole affair, as will be perceived by the above particulars, is extremely petty, and hardly worth any notice in a statistical point of view; only three or four families of villagers being employed in the manufacture, with one forge for smelting the ore, and another for working the copper into vessels.

SECTION V.—*Merits of the complaints of the Synjee and other villagers against the copper miners.*

These complaints are not directed against the miners of the copper, but against those of the iron mines, for cutting wood within the limits of their villages, without paying them any *malikana* for the privilege of doing so. There is not a single malgoozar of any of the villages in the neighbourhood of the iron mines, who has not at one time or other endeavoured to levy a tax on all the charcoal burners; quite forgetting that Government retain the right of wood, water, and minerals on all their grants for cultivation.

SECTION VI.—*On the possibility of economizing labour and fuel, and of preserving the forests.*

There cannot be a doubt as to the possibility of economy in the manufacture, nor as to its need; but the probability of its being effected, is quite another matter.

Should the manufacture be continued in the hands of the native community, it would be necessary before they could compete with the English manufacturers in price, in the markets of the plains, that they should be instructed in the following particulars, viz.:—

First.—The construction of a better description of furnace, after the pattern of the Swedish forge.

Secondly.—A more economical mode of manufacturing charcoal.

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Thirdly.—The manufacture of steel, to save the waste in the workmen's tools from breakage.

Fourthly.—The use and nature of fluxes.

The cheapness of labor would in a great measure compensate for the want of machinery; though, as the supply of water for a motive power is superabundant, this want could be supplied without much difficulty.

Should any English company be induced to undertake the manufacture, they would have great advantages in the following:—

First.—The resources of capital.

Secondly.—The abundance of water for machinery.

Thirdly.—The abundance of every material required in the manufacture.

But, on the other hand, they would labor under the following disadvantages:—

First.—The want of laborers; the present workmen only coming to work the mines from the latter end of March to the beginning of April. This want would doubtless after a short time disappear; as, where their caste did not interfere workmen would flock from Nepaul, allured by the regular pay which they would receive.

Secondly.—The want of any roads suited for carts; all the present roads being merely fit for coolies and mules. This would in my opinion prove an insuperable obstacle, as the mines are situated from 30 to 40 miles from the plains; the easiest route to which would be by following the course of the Ramgunga. To construct a cart road along this route would present engineering difficulties of the first class, the expense of overcoming which would be more than the benefit accruing thereby would warrant.

There are many other reasons which render it unlikely that Kumaon would be the first place in India for the employment of English capital in iron mines, which it is not my province here to detail. There is no doubt that the district would be a gainer to an incalculable extent; but

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whether the enterprize of its supporters would be rewarded sufficiently, is I think very doubtful.

Experience in England shows that, where the iron manufacture depends entirely on the extent of the forests for fuel, it can never rise to much importance. All the mines in Ireland have ceased to be worked, solely from the want of fuel; and in the reigns of Elizabeth and James the First (before the discovery of the uses of coal,) the want of wood was so severely felt in England that it gave rise to several laws forbidding the further destruction of the still remaining forest (*See Act* 1, *Chap.* 15 *of Elizabeth*). And at the present day, there is only one furnace, using only charcoal in England, viz., that of Ulverstone, in Cumberland.

If it were desirable to preserve the forests here, the only way would be to stop the manufacture entirely; but this would be extremely impolitic, for obvious reasons: and for what purpose would they be preserved?

J. O'B. BECKETT.

NOTE.—All the statements advanced by me in the above report relative to European modes of manufacture, &c., are made on the authority of Doctors Ure and Lardner.

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No. 5.

REGISTRATION OF DEEDS.

Statements showing the number and description of Deeds registered, from the year 1843 to 1852, in the N. W. P., by R. THORNTON, ESQ., *Register Sudder Dewanny Adawlut, N. W. P.*

ABSTRACT.

Description of Deeds registered.	Years. 1844	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	Total.
Deeds of Sale or Gift, ...	8,196	12,582	12,972	14,631	14,860	14,999	15,551	15,518	17,668	1,26,977
Deeds of Mortgage, ...	940	1,338	1,393	1,454	1,589	1,585	1,467	1,448	1,807	13,021
Other Deeds, ...	1,160	1,947	1,918	1,789	2,273	2,065	2,026	1,894	2,360	17,432
Total, ...	10,296	15,867	16,283	17,874	18,722	18,649	19,044	18,860	21,835	1,57,430
Costs of Registration, @ 2 Rs. each Deed, ... Rs.	20,592	31,734	32,566	35,748	37,444	37,298	38,088	37,720	43,670	3,14,860

Statement showing the number and description of Deeds districts of the

Names of Districts.	1844.			1845.			1846.		
	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.
Delhie, ...	785	274	180	739	279	131	833	329	136
Goorgaon, ...	8	5	4	67	38	94	60	27	59
Rohtuc, ...	3	1	2	37	10	9	38	13	21
Paneeput, ...	51	2	2	166	48	38	150	67	16
Hissar, ...	1	1	4	22	7	78	19	6	58
Sirsa, ...	7	2	6	22	7	36	18	3	19
Seharunpoor, ...	537	0	0	614	0	0	653	0	0
Moozuffernuggur, ...	0	0	0	259	0	0	399	0	0
Dehra Doon, ...	0	0	0	28	0	0	28	0	0
Meerut, ...	535	0	0	745	0	0	716	0	0
Boolundshuhur, ...	376	0	0	419	0	0	353	0	0
Allygurh, ...	71	61	104	155	118	198	128	105	222
Moradabad, ...	98	42	94	163	90	18[illegible]	191	115	225
Bareilly, ...	102	0	0	518	0	0	657	0	0
Bijnour, ...	0	0	0	64	29	199	84	56	256
Pilleebheet, ...	11	0	0	251	0	0	293	0	0
Budaon, ...	146	0	0	1256	0	0	1069	0	0
Shahjehanpoor, ...	198	0	0	695	0	0	800	0	0
Agra, ...	108	74	86	102	100	127	129	85	122
Muttra, ...	0	0	0	156	86	161	77	55	109
Furruckabad, ...	234	128	102	401	182	119	300	154	146
Mynpoorie, ...	68	0	0	118	0	0	197	0	0
Etawah, ...	31	0	0	119	0	0	133	0	0
Etah, ...	0	0	0	0	0	0	0	0	0
Cawnpoor, ...	254	149	96	390	129	120	336	166	117
Futtehpoor, ...	162	64	139	117	52	113	132	44	108
Banda, ...	197	0	0	280	0	0	250	0	0
Humeerpoor, ...	0	0	0	0	0	0	18	0	0
Calpee, ...	0	0	0	0	0	0	24	0	0
Allahabad, ...	399	0	0	413	0	0	473	0	0
Goruckpoor, ...	272	0	0	367	0	0	758	0	0
Azimgurh, ...	547	137	341	531	136	329	375	142	303
Jounpoor, ...	703	0	0	697	0	0	667	0	0
Mirzapoor, ...	559	0	0	631	0	0	631	0	0
Benares, ...	824	0	0	1019	0	0	1015	0	0
Ghazeepoor, ...	918	0	0	956	0	0	950	0	0
Simla, ...	0	0	0	20	27	7	18	26	1

registered, from the year 1843 to 1852, in the several N. W. Provinces.

1847.			1848.			1849.			1850.			1851.			1852.		
Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.	Deeds of Sale or Gift.	Deeds of Mortgage.	Other Deeds.
889	362	123	802	390	114	764	417	155	765	436	161	861	449	166	755	481	131
71	36	65	69	37	75	77	49	89	89	64	86	54	49	81	62	53	103
52	18	23	42	19	33	38	14	27	48	15	41	47	31	68	78	30	135
146	49	48	180	75	45	178	67	54	189	58	40	147	52	34	175	82	73
34	21	48	25	6	142	30	45	77	49	28	52	24	22	35	32	26	8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
867	0	0	688	0	0	821	0	0	641	0	0	775	0	0	1014	0	0
350	0	0	360	0	0	299	0	0	350	0	0	285	0	0	383	0	0
27	0	0	31	0	0	80	0	0	22	0	0	37	0	0	42	0	0
886	0	0	1004	0	0	1051	0	0	811	0	0	628	0	0	858	0	0
408	0	0	643	0	0	632	0	0	509	0	0	280	0	0	492	0	0
178	152	289	169	128	349	166	94	278	195	119	284	178	136	234	236	184	356
194	98	178	196	107	249	202	108	243	233	126	210	217	108	234	246	195	366
781	0	0	764	0	0	826	0	0	710	0	0	882	0	0	1116	0	0
116	45	213	99	38	202	80	34	136	133	39	240	101	40	210	107	54	217
174	0	0	288	0	0	239	0	0	213	0	0	287	0	0	454	0	0
1293	0	0	1397	0	0	1488	0	0	1566	0	0	1471	0	0	1677	0	0
1221	0	0	893	0	0	873	0	0	1113	0	0	1075	0	0	1301	0	0
140	81	144	132	105	110	131	70	103	153	106	150	152	111	110	23	138	185
132	69	72	233	151	183	130	90	147	137	77	125	185	75	99	176	83	100
421	163	105	368	167	124	465	188	94	454	193	110	375	195	131	476	284	130
148	0	0	221	0	0	179	0	0	225	0	0	251	0	0	291	0	0
146	0	0	118	0	0	151	0	0	167	0	0	176	0	0	266	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	103	0	0
367	207	137	336	180	151	395	213	123	706	0	0	597	0	0	692	0	0
188	57	112	149	65	124	177	67	173	161	57	163	103	44	152	129	63	173
177	0	0	118	0	0	119	0	0	195	0	0	152	0	0	181	0	0
76	0	0	125	0	c	80	0	0	156	0	0	166	0	0	164	0	0
48	0	0	71	0	0	35	0	0	0	0	0	0	0	0	0	0	0
902	0	0	937	0	0	1073	0	0	1009	0	0	1003	0	0	935	0	0
388	0	0	457	0	0	477	0	0	460	0	0	474	0	0	515	0	0
462	96	239	434	121	372	418	129	366	420	149	364	478	136	340	399	134	378
585	0	0	616	0	0	578	0	0	604	0	0	615	0	0	657	0	0
532	0	0	560	0	0	573	0	0	596	0	0	675	0	0	605	0	0
1038	0	0	1056	0	0	1051	0	0	1179	0	0	1469	0	0	1554	0	0
1164	0	0	1339	0	0	1181	0	0	1285	0	0	1297	0	0	1265	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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No. 6.

SELECTED PAPERS FROM THE CORRESPONDENCE OF THE GOVERNMENT, N. W. P., REGARDING THE PREPARATION OF DISTRICT MAPS, SHOWING VILLAGE BOUNDARIES.

No. I.—CIRCULAR J.; *from* W. MUIR, ESQ., *Secretary Sudder Board of Revenue, N. W. P., to all Commissioners in the N. W. P., dated Agra, the 8th December, 1848.*

Present:
H. S. BOULDERSON, ESQ., *Member;*
F. H. ROBINSON, ESQ., *Officiating Member.*

SIR,—It having come to the notice of the Board that in some districts the boundaries defining the jurisdiction of the several departments are not coincident, but unaccountably irregular, the Board desire that a map of each district may be prepared, showing the fiscal, judicial, and criminal divisions, in blue, red, and yellow lines. The map must also contain the boundaries of each village.

2*nd*.—Where any such map is already in existence, it may be forwarded in reply to this requisition.

I have, &c.,
W. MUIR,
Secretary.

No. II.—CIRCULAR C.; *from* W. MUIR, ESQ., *Secretary Sudder Board of Revenue, N. W. P., to all Commissioners in the N. W. P., dated 2nd February, 1849.*

Present:
H. S. BOULDERSON, ESQ., *Junior Member.*

Maps showing village boundaries, and the fiscal, criminal, and judicial divisions.
Board prescribe rules for carrying out the above.

SIR,—With reference to the Board's Circular J., dated the 8th December last, in which district maps, showing village boundaries, and the fiscal, criminal, and judicial divisions were called for, it has been represented to the Board from several districts that the

nature of the materials at hand makes it a matter of much difficulty to carry out their orders.

2nd.—It is advisable, therefore, that where any such difficulty is experienced, the work should not be entered upon, until complete information has been obtained as to the exact nature of the materials for compiling the required maps, which may exist in your own and the Collector's offices, or in those of the Surveyor, or elsewhere.

3rd.—I am accordingly directed to request that you will furnish the Board with accurate information on this subject, and also submit a Tabular Statement of the result, in the form annexed to this letter, including all the districts in your division.

4th.—As the attention of Government is directed to the subject, the Board are anxious to receive an early and complete return.

I have, &c.,
W. MUIR,
Secretary.

District.	Pergunnah.	*Whether any Map, with Village boundaries, exists for*		Whether any such Maps exist in Commissioner's Office.
		The District, and on what Scale.	For the , and on what Scale.	

W. MUIR,
Secretary.

No. III.—MEMORANDUM *by the* HON'BLE *the late Lieutenant-Governor, dated 13th February, 1849.*

I HAVE lately received from Mr. C. Gubbins a map of the country around Meerut, compiled from the village maps of the Revenue Survey, by Mr. Dodsworth, the Surveyor attached to the Ganges Canal.

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2. The map is on the scale of two miles to the inch. It includes the land between the Ganges and the Hindun, from Moozuffernuggur on the north, to near Boolundshuhur on the south. It has been tested by that part of the triangulation of the Great Trigonometrical Survey which falls within its area, and is found to be substantially correct,—quite sufficiently so for all practical purposes.

3. In its present state the map is of no use. It does not contain the whole of any one district, for the villages between the Hindun and Jumna are wanting, to complete the map of Meerut. There are also many omissions, in the body of the map, of villages, the maps of which could not be found. The limits of the district are not laid down, and the coloring of the pergunnahs is very different from the present arrangement. The roads also are incorrectly inserted. The map will therefore be returned to Mr. Gubbins for completion and correction.

4. I propose, however, to consider this map as a specimen of the materials which are available for the compilation of good district maps of all our districts. There can be no doubt of the value to every local officer of such a map, showing the village boundaries, and colored according to the existing pergunnah divisions, but showing also the tehseeldaree, thannah, and moonsiffee boundaries. They should further show all the lines of road which are kept in repair by the Government or the Local Committees, and all canals and rajbuhas wherever such exist.

5. Major Cautley informs me that he has already in his office a great part of the Doab mapped in this manner. In order to render his maps complete, for the purposes of all other officers as well as himself, it is only necessary that he should act in concert with the district officers. The object of this memorandum is to point out how this co-operation can be best effected. The map of Meerut, to which I allude, has advanced further than is necessary for useful co-operation.

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6. Major Cautley should divide his map of the Doab, so that each map should be a little larger than a district.* He should then prepare a copy, laying down all the boundaries of villages, with their names. This should be corrected, as to form and outline, by the delineation of the country in the Court of Director's Great Indian Atlas (4 miles to an inch), many sheets of which have lately been published, giving all the details from the Revenue Survey maps. Wherever the maps of villages are missing, the name should be left blank, and attention drawn to the spot by a pencil mark, and memorandum on the side.

7.—The district map, so prepared, should be sent to the Collector and Magistrate, who will mark in pencil the district boundary, and also the limits of the tehseeldarees, thannahs, and moonsiffees. He will further insert in pencil the Government and Local Committee roads to the best of his ability.

8. If the Collector and Magistrate himself is not able to do this, probably some subordinate officer connected with the district can do it; or if not a Surveyor, specially deputed for the purpose, can easily effect it, if the Collector and Magistrate will place at his disposal the information on the subject, which is available in the district.

9. The Canal Officer should similarly insert all the Canals and Rajbuhas.

10. The map thus filled in should be lithographed and furnished to all public offices.

11. I have ascertained that at Agra a map of the kind I have mentioned can be copied and lithographed for about 200 Rupees. This would cover the cost of 200 copies, exclusive of coloring and paper. It might be well to have it lithographed in the stage described in paragraph 6,

* Every district map should show the adjoining villages of the neighbouring district wherever a large river does not form the boundary, for it is frequently desirable for a district officer to know what villages of a neighbouring district are conterminous with those of his own.

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striking off fifty copies on inferior paper, and distributing them for the correction and filling in of details to the different officers, whose co-operation is necessary. The coloring and details would afterwards be inserted by hand on the 150 copies that had been printed on good paper.

12. Major Cautley informs me that he has already drawn, in a similar style, all the tract to the west of the Jumna, irrigated by the Western Jumna Canal, so far as he could procure the maps. A map of the sort he requires, of the villages in the Istumraree Talooka of the Kurnaul Mundals, will be found in the office of the Collector of Paneeput, and Captain H. V. Stephen, the Surveyor of the Cis-Sutlej Sikh states, will no doubt afford him the benefit of any maps he may have.

13. I know well that in many districts, where Major Cautley's operations have not yet extended, Pergunnah Maps of the specified kind are in the Collector's hands; *e. g.*, at Agra, at Cawnpore, and at Azimgurh. It only requires that these be united into one, reduced to the proper scale, and corrected by the "Indian Atlas." Till this is done, there will be no certainty that full effect has been given to the Resolution of Act XXX., 1837, for arranging the Civil divisions of the country, nor will the district maps be so correct as they should be. In the revised edition of those maps, which is now in course of publication at Calcutta, there are I fear many errors in the shape of the districts and coloring of the pergunnahs.

14. Wherever the villages are much smaller than in Meerut, as is the case in the Benares Division, the scale on which the maps are constructed must be larger,—say one mile to the inch.

15. I now wish that a copy of this memorandum may be sent to the Sudder Board of Revenue, to Major Cautley, and to the Deputy Surveyor General, in order that each of those authorities may be officially apprized of the

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object proposed for accomplishment, and of the means available for effecting it.

J. THOMASON.

No. IV.—Minute *by the* Hon'ble *the late* Lieutenant Governor, *dated 8th March*, 1852.

On February 13th, 1849, I recorded a Memorandum regarding the preparation of district maps, on an enlarged scale, showing village boundaries, &c. Since then the work has been going on, but not with the regularity or accuracy I could have wished.

Lieutenant-Colonel Cautley has favored me with a memorandum of the mode in which he would recommend that we proceed. I have availed myself of it in drafting the instructions which accompany this.

I have been frequently surprised to find how imperfectly the principles laid down in the Resolution of Act XXX. 1837, for the arrangement of the interior divisions of districts, have been carried out during the fourteen years that have since intervened. The arrangement is in itself most simple, and the principles on which it is to be effected, as there laid down, are unquestioned, and yet the boundaries, even of districts, have not always been laid down in conformity therewith.

Taking the 31 Regulation districts as they run from north-west to south-east, I will note how far I believe the provisions of the Resolution of Act XXX. 1837 to have been carried out regarding each. Hissar, Rohtuk, and Paneeput, I believe are completely arranged and ready for the formation of maps. In Delhi the tehseeldaries, and perhaps the pergunnahs, are right, but much improvement may be effected in the thannah jurisdictions. This should be done immediately. Mr. Robert's attention has been drawn to the subject. The pergunnah maps of

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Goorgaon have just been completed in the office of the Sudder Board of Revenue. A district map, on the scale of two miles to an inch, is still wanted.

The map of Seharunpore has been furnished by the Surveyor General. I believe the tehseeldarees and thannahs are well arranged, but the grouping into pergunnahs has never been looked to, any further than was necessary to ensure that no pergunnah had villages in different tehseeldaries. The coloring, as given in the Deputy Surveyor General's office, is according to pergunnahs, and therefore shows a mass of confusion. I pointed out to Mr. Craigie at Roorkee, at the end of January last, the inconvenience which arose from a neglect of the course of proceeding prescribed in the Resolution of Act XXX, 1837, where the first step is the arrangement of pergunnah boundaries. He promised to have this mistake corrected and to send a map rightly colored.

The map of Moozuffernuggur has been lithographed. All the internal arrangements are complete and excellent, though I question whether the southern boundary with Meerut is what it should be. There are 17 pergunnahs, each of which constitutes a thannah jurisdiction, and the pergunnahs are grouped into five tehseeldarees. A note is wanted, explaining this arrangement. Such a note was given by Mr. Astell, but by some accident has been omitted. Meerut requires considerable change, which is made the subject of a separate memorandum of this date. Of Boolundshuhur I know nothing. Allygurh has been well arranged by Mr. E. Tyler, and may be printed forthwith.

I am not well aware of the state of things in Rohilcund. Moradabad I remember was well arranged by Mr. Wilson some years ago, and I believe the other districts are also right. Muttra, Agra, Mynpoory and Furruckabad I believe are all ready to be lithographed. There was much correspondence with the Deputy Surveyor General about the last-named district a year or two ago.

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The map of Etawah has been lithographed. The execution of the original map was coarse, and both the form of the district and distribution of the thannahs might be improved. The signs also are not those prescribed in paragraphs 5 of the accompanying instructions. Still with all its defects the map is a very useful one, and a good step to the preparation of better ones.

Cawnpore, from the maps attached to Mr. Montgomery's statistical report, seems to be very complete. We only need the district map compiled from the pergunnah ones. Futtehpore has been, I believe, well arranged by Mr. W. Muir. Allahabad was the subject of correspondence in the middle of last year, and it is not improbable that some change may take place in the thannah jurisdictions. Banda and Humeerpore I believe now to be rightly arranged, but am not confident of this.

In the Benares Division, Goruckpore and Azimgurh are I believe complete; but maps are wanted, and as the mouzahs are small, I fear it will be needful that these maps be on the scale of one mile to the inch. The old district maps are on the scale of two miles to the inch, and as those are very correct, perhaps pergunnah maps will be more convenient than district ones, on so large a scale as one mile to an inch. Jounpore was well arranged a couple of years ago, but a good map, showing village boundaries, is much wanted. I cannot say how the sub-divisions of Mirzapore, Benares and Ghazeepore are. Probably no further arrangement is necessary. Only maps are required.

The above short notice may give some idea of the work to be done. We have next to consider the agency available.

Lieutenant-Colonel Cautley has undertaken to compile all the maps in his Canal districts. These include all the Delhi Division, except Goorgaon, which is separately done, and the Dooab down to Futtehpore, inclusive I believe of that district. In these parts, then, I understand

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that Lieutenant-Colonel Cautley will take what is devolved upon the compiler in the instructions. Herein he lays the Government under a great obligation, for the work is troublesome, and he will do it well.

In Rohilcund Mr. Dick, the Commissioner, will be able to effect all that is required, through the agency of Lieutenant Vanrenen and Lieutenant Burgess, both of whom are in the Division, with very efficient establishments.

I cannot at once suggest an expedient for obtaining good maps of Allahabad and Bundlecund. Mr. H. C. Tucker, the Collector, can perhaps undertake for the first, and Mr. Hillersdon for Banda. Mr. R. Thornton will do what he can for Humeerpore, as he finds leisure.

For the Benares Division I must look to Mr. E. A. Reade, who will say what can be done.

But all these arrangements will fail without a central and controlling regulating agency. Mr. Christian, the Secretary to the Sudder Board of Revenue, will be able to supply this, and to him I willingly entrust it. His first operation must be to ascertain what has been done in each district, both towards the arrangement of the sub-divisions, pergunnahs, tehseeldarees and thannahs, and also towards the compilation of maps. For this purpose, the records of the Secretariat, as well as of the Sudder Board of Revenue, are open to him. What information the records cannot supply, must be sought by written queries from the district officers themselves. All the information, anyhow procured, should be shown in a register, of which a leaf or two may be appropriated to each district. In the Register may be entered not only the sources whence the information is procured, but also each step of the operation, till the arrangement of the district is perfect, and the map lithographed. Whenever I am at Agra, my own assistance will readily be given in support of Mr. Christian's labors.

J. THOMASON.

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No. V.—MEMORANDUM *of* INSTRUCTIONS *issued for the preparation of* DISTRICT MAPS, *showing Village boundaries.—Dated 14th April,* 1852.

1. The maps should be generally on the scale of two miles to an inch. When the mouzahs are very large, as for example in Hissar and Rohtuk, a scale of 4 miles to an inch is sufficient. Where the mouzahs are very small, as in Goruckpore and Azimgurh, a scale of one mile to an inch may possibly be necessary.

2. The map should be first put together, so as to show only village boundaries, sites of villages and rivers.

3. This map should be sent to the Executive Officer of Roads (if there be any officer of that department in the district), in order that he may enter therein the road under his charge. He must be careful that the village sites, on his line of road, are correctly shown, and should note any errors he may detect. The map should be returned by him to the compiler.

4. The map should then be sent to the Executive Officer of the Canal Department (if there be any canal in the district), in order that he may enter his canal and rajbuhas. Having done this, he should return it to the compiler with his remarks.

5. The map should then be sent to the Collector of the district. He will mark the boundaries of pergunnahs, tehseeldarees and thannahs. If these have not been arranged according to the Resolution of Act XXX., 1837, (Appendix No. VI. of Directions for Settlement Officers), or if purporting to have been so arranged, the arrangement be yet defective, he will immediately report, through the Commissioner, to the Sudder Board of Revenue, the alterations he recommends. The arrangement having been completed, he will note in pencil on the map the several boundaries, and return the map with a separate note to the compiler.

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6. The compiler will then color the map, giving the pergunnahs of different colors, and showing, by a table in the corner, the distribution into thannahs and tehseeldarees. When a thannah boundary runs through a pergunnah, it should be shown by a deep shaded line of the pergunnah color. The topographical signs should be the same that are given at the end of Appendix No. XXIV., Directions for Collectors.

7. The map, when thus completed, should be sent by the compiler to the Secretary to Government, North-Western Provinces, who will take measures for its being lithographed. Proofs will, if possible, be sent to the compiler, that he may make any corrections which occur to him, especially in the orthography of the names.

W. MUIR,
Secretary to Government.

No. VI.—*Extract paragraphs* 1 *to* 4 *of Letter from Secretary to Government, N. W. P., to Secretary to Sudder Board of Revenue, N. W. P., No. 2519.—Dated 29th June, 1853.*

Sir,—It has been brought to the Lieutenant-Governor's notice that maps, showing village boundaries on the scale of two miles to an inch, with the names of villages, &c., inserted in Oordoo or Hindee, at an expense of 200 Rupees for 300 copies of each version, can be furnished from the office of the Deputy Surveyor General in Calcutta.

2. The mode of procedure, in the preparation of these maps, has been thus arranged. After the English map of each district, on the above scale and plan, has been finally completed, two manuscript skeleton maps are prepared in the Deputy Surveyor General's Office, showing only village boundaries and geographical features. These are sent to your office, where the names are filled in, being written in Oordoo in one copy and in Hindee in the other. The maps thus filled in are to be returned to the Deputy

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Surveyor General, by whom they will be transferred to stone, and 300 copies of each struck off at a cost of 200 Rupees* for each impression.

3. The map of Muthra, thus prepared in Oordoo and Hindee, has been shown to the Lieutenant-Governor, and has met with approbation.

4. I am now desired to communicate to you the sanction of the Government to the disbursements necessary for giving effect to this plan throughout the North-Western Provinces. The Board will arrange with the Deputy Surveyor General for passing the bills for each map, in such method as may be most convenient.

W. MUIR,
Secretary to Government.

No. VII.—*From* G. J. Christian, Esq., *Secretary to the Sudder Board of Revenue, North-Western Provinces, Agra, to* W. Muir, Esq., *Secretary to Government, North-Western Provinces, No. 684 of 1854.—Dated Agra, the 12th of September, 1854.*

Sir,—I am desired by the Sudder Board of Revenue to acknowledge the receipt of your letter, No. 2481, dated 23rd May, 1854, calling for a report of the progress made in giving effect to the instructions contained in the Minute of the late the Hon'ble Lieutenant-Governor, dated 8th March, 1852, regarding the compilation of District Maps, showing village boundaries on the scale of two miles to an inch.

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* Drawing on Transfer Paper, ...	100
Coloring, at 4 annas, ...	50
For 200 copies, ...	150
For every additional 100 copies, ...	50
Total, ...	200
In both languages, Hindee and Oordoo, ...	400

2nd.—The enclosed memorandum, compiled in the Board's Office, shows the present state of the work in the settled districts of the Delhi, Meerut, Rohilcund, Agra and Allahabad divisions. The district of Bhutteeana, in the Delhi division, and the whole of the Kumaon division, have been omitted from the list. No materials exist for the preparation of maps of the kind required for Gurhwal and Kumaon, and although zillah Bhutteeana has been professionally surveyed, His Honor the late Lieutenant-Governor considered it unnecessary to incur the expense of a detailed map of that district, and one on a reduced scale of four miles to an inch, not showing village boundaries, was lithographed in Calcutta by the Deputy Surveyor General, under his orders in 1852.

3rd.—The omission of the districts of the Benares division has arisen from a different reason. Ample details are forthcoming for the compilation of maps showing village boundaries, (except for the southern portion of zillah Mirzapore,) as pergunnah maps showing village boundaries on various scales exist for all the rest of the division. But, as pointed out in paragraph 8 of the Board's address, No. 423, dated 2nd June, 1854, which for facility of reference is quoted in the margin, the smallness of the mouzahs, and the great size of the districts, (Benares itself excepted) would make maps of the kind required too large to be handy, and too small to be clear. But as soon as the Board find leisure from the compilation of District Maps of other divisions, they propose to lithograph editions of the Pergunnah Maps of this division,

His Honor will observe from the memorandum that the Benares division has not been commenced upon. It was found that the smallness of the mouzahs, and (with the exception of Benares itself,) the large extent of the districts, rendered maps of the scale prescribed useless. They were at once too large to be handy, and too small to be clear. But the Junior Member of the Board, (when Commissioner) recorded his opinion that lithographed Pergunnah Maps, on a scale of one mile to an inch, would reduce the correspondence of his office by one-fourth. Such maps in English, Oordoo and Hindee, will be prepared; but the existing pergunnah maps are not all on this scale, so that the work in this division will be great.

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showing village boundaries on the scale of one mile to an inch.

4*th.*—The Board, in paragraphs 2 to 4 of their address above quoted, which are also inserted in the margin, noticed several districts in which, notwithstanding the lapse of 16 years, the provisions of the Resolution of Government, dated 30th October, 1837, had been either incorrectly, or only partially carried out, and in many of which measures were still in progress to rectify errors, or supply omissions.

> There are several causes which delay the compilation and publication of these maps, some of which the Board proceed to mention. Although upwards of 16 years have passed since the issue of the Resolution of Government, dated 30th October, 1837, (Appendix VI., Directions to Settlement Officers,) the preparation of these maps has brought to notice that, in several districts, the provisions of that Resolution had either been altogether overlooked, or partially or incorrectly carried out, and the reason is obvious; it is only when a map showing village boundaries, and colored pergunnahwar, is attempted, that errors in the definition of the boundaries of pergunnahs and jurisdictions are discovered.
>
> His Honor the late Lieutenant-Governor, during his tour in the Delhi division in 1852, detected errors or omissions of this kind in Hissar, Paneeput, Rohtuck and Delhi, and the Board have been obliged to direct the revision either of pergunnahs or jurisdictions, (subject to the confirmation of Government) in Goorgaon, Seharunpore, Boolundshuhur, Bijnour, Bareilly, Budaon and Furruckabad. In some of these districts the changes required are very small, but in others, as Seharunpore and Boolundshuhur, they will necessarily embrace a large portion of the district. In addition to these, Meerut and Allygurh have recently been revised, the latter slightly, the former extensively.
>
> The detection of errors requiring revision of pergunnahs or jurisdictions, and their correction, leads to much correspondence, and necessarily delays the completion of the maps, sometimes when just ready for transfer. In many of the districts above noticed, the Collectors and Commissioners believed the pergunnahs and jurisdictions to have been defined according to the Resolution of Government, already quoted.

5*th.*—The Board understand that Resolution to inculcate the following general principles:—

I.—That the first step in the arrangement of the internal divisions is so to adjust the limits of existing pergunnahs, that each shall have its mouzahs, as it were, in a ring-fence, so that no pergunnah shall have outlying mouzahs within the limits of another pergunnah, nor any mouzahs of another pergunnah within its own limits.

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II.—That in making the necessary transfers for the adjustment of the boundaries of pergunnahs, those only shall be admitted which are absolutely necessary, or at least highly expedient, and that the limits of the old fiscal divisions of the country, and their ancient names, shall be maintained as far as is compatible with our system of Civil administration.

III.—That with this view, where two pergunnahs have their mouzahs inextricably intermixed in position, the two shall be thrown into one pergunnah, bearing their joint names.

IV.—That care be taken not needlessly to break up a talooqah, or separate into different pergunnahs clusters of mouzahs held by the same classes, or under similar tenures.

V.—The limits of the several pergunnahs of a district having been adjusted on these principles, that tehseeldaree divisions shall be so arranged that each shall include one or more entire pergunnahs, so that the mouzahs of one pergunnah shall not lie partly in one tehseel, and partly in another.

VI.—That the several elements of area, population, jumma, and the number, size and nature of tenure of mehals, on which last consideration the amount of work in a fiscal division, fairly assessed, to a considerable extent depends, be duly regarded in fixing the limits of a tehseeldaree division.

VII.—That the boundaries of the thannah jurisdictions shall be so fixed, that each tehseeldaree may contain one or more entire thannahs; so that no thannah shall have its villages, some in one tehseeldaree and some in another.

VIII.—That the jurisdiction of each Moonsiff shall extend over one or more entire tehseeldarees; or where this is impossible, from the number of large towns, or other causes, that by confining the jurisdiction of one Moonsiff to a large town and its suburbs, and by giving to another the rest of a large tehseeldaree, the civil and fiscal jurisdictions be kept, as far as possible, co-termin-

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ous, so that no tehseeldaree have its villages partly under one Moonsiff and partly under another.

IX.—That in fixing the sites of tehseeldarees, thannahs and moonsiffees, due regard be paid to important lines of road, to large towns, and to accepted statistics of crime, population, castes, tenures and the like.

X.—That great care be taken to keep important lines of road continuously in the same district, tehseeldaree and thannah.

XI.—That the thannah and pergunnah limits shall be made co-terminous, if this can be easily effected; but that the point is of minor importance, provided the pergunnahs and tehseeldarees, the thannahs and tehseeldarees, and the moonsiffees and tehseeldarees are respectively co-terminous.

XII.—That no changes, whether in ancient pergunnahs or modern jurisdictions, shall be allowed, unless necessary, or highly expedient, changes being in themselves distasteful generally to the people, and rendering former statistical returns more or less useless.

6th.—These principles were enforced by His Honor the late Lieutenant-Governor, in the districts of Bhutteeana, Hissar, Paneeput, Delhi and Rohtuk, after his tour in that division in 1851-52, and the same are now being applied to Goorgaon, the remaining district of that division, though the Board have to complain of great delay in the submission of the report, long since called for from the local authorities.

7th.—In the Meerut division, the orders of Government have been issued, confirming the changes made in Meerut and Allygurh. The district of Mozuffurnuggur requires no internal alteration. The revision of jurisdictions and pergunnahs in Seharunpore has been reported to Government, and further information called for; in Boolundshuhur a report of necessary changes has been long promised, but has not yet reached the Board.

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8th.—In the Rohilcund division, slight alterations have been found expedient in Bijnour, Budaon and Bareilly, and these have been mostly completed, though the final reports have not been received in this office.

The report for Bareilly has since been received, with Commissioner's letter, No. 365, dated 1st September, 1854.

9th.—In the Agra division, changes are required in Furruckabad and Etah. Those of Mynpoorie were only sanctioned in 1851. The establishment of an independent Deputy Collectorate at Etah will also alter the limits of the adjacent districts of Budaon, Mynpoorie, Furruckabad and Allygurh. Muthra and Agra have needed no alteration.

10th.—The districts of Futtehpore and Banda, in the Allahabad division, call for no remark. In Cawnpore, owing to the size and importance of the Sudder station, the Board have been unable to make the thannah and tehseel jurisdictions co-terminous throughout the district. But the defect is limited in extent, and appears to be without remedy. There is a similar difficulty in Allahabad, regarding which the Board, who have called for a further report, will address Government hereafter. The district of Humeerpore has been much altered of late by the addition of pergunnahs Jeitpore and Mahoba, and the loss of pergunnahs Kalpee and Koonch. The local authorities have proposed certain changes now under consideration.

11th.—The Benares division needs no orders. In every district of that division the limits of pergunnahs and jurisdictions have been carefully revised, and the provisions of the Resolution of Government carrried out; except where, in the Benares province, the Muhalwar arrangements at settlement make exact adherence to those provisions impossible.

12th.—It appears, therefore, that out of thirty-four districts (including Bhutteeana and Etah), the provisions of the Government Resolution of 30th October, 1837, were car-

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ried out as recently as 1851-52 and 1852-53, in eight; viz. :—

Bhutteeana.	Rohtuk.
Hissar.	Allygurh.
Paneeput.	Meerut.
Delhi.	Mynpoory.

Had been previously attended to in sixteeen; viz. :—

Dehra Doon.	Shahjehanpore.
Mozuffurnuggur.	Benaresdivision, 6 zillahs.
Muthra.	Cawnpore.
Agra.	Futtehpore.
Etawah.	Banda.
Moradabad.	

And still require to be enforced in ten; viz. :—

Goorgaon.	Bijnour.
Seharunpore.	Budaon.
Boolundshuhur.	Bareilly.
Furruckabad.	Allahabad.
Etah.	Humeerpore.

13*th*.—It has been customary for the Board, as they took the map of each district under consideration, to call for a clear report, with a tabular statement of pergunnahs and jurisdictions, in order that if any error in the adjustment of limits had been made, to have a report submitted, while the map was under compilation or examination. But frequently, as in the case of Budaon, Bijnour and Furruckabad, existing errors have not been brought to light until the map, showing village boundaries, at once discovered them. Indeed, without such a map, it is not easy to tell certainly whether jurisdictions are conterminous or not.

14*th*.—The Board have now full information before them on this important subject, and for the ten districts requiring orders, they have only to see that reports called for are

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submitted without delay, and those under consideration speedily disposed of. This information has not been collected for all the districts of these Provinces, without much labor and voluminous correspondence, and in each district the re-adjustment of boundaries, from the first report of the Collector to the final orders of Government, is a work of time and difficulty.

15*th*.—Next as to the existing materials for the dist rict maps. For those districts, of which English editions have been already published, the preparation of vernacular versions in Oordoo and Hindee will require only translation, and copying on transfer paper; and for the English editions of maps not yet published, His Honor will observe from the memorandum, that for all the districts therein entered, maps have been completed in skeleton, except for portions of Bijnour, Moradabad, Budaon and Humeerpore; but for these portions, data more or less complete have been collected.

16*th*.—In order to ascertain the available data for each map, the Board consulted lists of survey records, dated 29th January, 1848, and 5th March, 1849, received from the Survey Office, and also the returns to their Circular No. C., dated 23rd February, 1849. But as these lists were found to be imperfect, and not unfrequently incorrect, a separate reference was made in every case, in which data were deficient, to the Collectors, the Commissioners, and the Deputy Surveyor General's offices, and further search has, on more than one occasion, been successful.

17*th*.—In the Doab, within the sphere of the operations of the Ganges Canal, and beyond it, along the line of the Western Jumna Canal, the Board have received the most valuable assistance from Lieutenant-Colonel Cautley and the Canal Department, as will be seen from the memorandum, and from the accompanying abstract, showing the

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several offices in which skeleton maps have been compiled:—

Canal office.	Survey office.	Board's office.	Divisional office.	Collectorate office.
Paneeput. Delhi. Rohtuk. Seharunpore. Mozuffurnuggur. Meerut. Boolundshuhur. Allygurh. Mynpoorie. Furruckabad, Cawnpore. Futtehpore. Allahabad.	Dehra Dhoon.† Muthra. Agra. Banda. † By the Revenue Surveyor	Goorgaon. Budaon.* Humeerpore.	Bijnour.	Hissar. Moradabad.* Bareilly. Allygurh. Etawah. Cawnpore.

The maps marked thus * are still incomplete. In the case of Cawnpore, the preparation of a duplicate map was an oversight of the Collector, who had received information of a map being under compilation in the Canal office. In Allygurh, the Collector's map had been mislaid, and a duplicate was prepared.

18*th*.—All these maps, except those of Mozuffurnuggur and Etawah, which were published before the issue of the Minute of 8th March, 1852, and Bijnour, Moradabad, Bareilly and Allahabad, which have not yet reached the Board, have been carefully examined, or are now undergoing that process in their office. That examination has never failed to bring to light numerous errors and omissions, some due to the mistakes of the compiler, and others to the imperfect data at his command.

19*th*.—These errors and omissions are supplied here, as far as possible, from the maps, without village boundaries, formerly lithographed by the Board, or by the Deputy Surveyor General, and from data obtained from the Survey office; or the map is returned to the Collector, to rectify the errors, and supply the omissions from the village plans and area tables; or failing these, (as in Paneeput,)

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by actual survey. It is right here to observe that a complete examination can only be made by a reference to the data, whether village plans or pergunnah maps, from which the district map has been compiled. These are not always available here.

20th.—In this office also, the names of the frontier villages of adjacent districts are added from the existing maps of those districts; and where these are not available, the village plans, which generally, but not invariably, give the information, are referred to. On this point the following remarks occur in paragraph 9 of the Board's address, already quoted:—

Para. 9.—" And the insertion in all the zillah maps, " (and in the pergunnah maps of the Benares Division,) " of the names of adjacent mouzahs, though a most essen- " tial, is not always an easy matter; and where rivers in- " tervene, is frequently very difficult. In order to obtain " this information, it will be necessary to delay the publi- " cation of each map, until the maps of all the adjacent " districts have been received. Thus the map of Banda is " now undergoing final examination, and the adjacent vil- " lages can be inserted from the maps of Futtehpore and " Humeerpore; but the map of Allahabad is still under " compilation, and must be waited for."

21st.—The Minute of 8th March, 1852, directs that each map, compiled in skeleton, shall go the round of the Revenue, Canal, and Road departments, and this rule has been generally followed. But it is productive of delay, especially in the Road department, and the map is lost sight of for too long a period by the supervising authority. It is usual now for the Board to forward the map first to the Collector, who inserts in pencil the limits of pergunnahs and jurisdictions; the sites of tehseeldarees, moonsiffees, thannahs and chowkees; the lines of roads under the Local Committee, Ferries and Bridges; and, after reference to the Customs' authorities, the customs' line and open

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posts, if it pass through the district. He then returns the map, with a memorandum of roads metalled and unmetalled, and a table of pergunnahs and jurisdictions, and such further information as the Board, after examination and inspection may have called for. If the Grand Trunk Road intersect the district, the map is sent to the Executive Engineer in charge for the insertion of it, and of all chowkees on it. Finally, the map, after its return, is forwarded to the Canal department, for the careful entry of the drainage, canals and rajbuhas. On the return of it, a final examination is made, the signs, marginal memorandums, and other details, completed, and the map is ready for transfer.

22nd.—The only maps, for which the earlier surveys are defective, or the records not forthcoming, and for which the assistance of the Canal department has not been secured, are the districts of the Rohilcund division. But in Budaon, the deficiencies can be supplied here from the village plans and area tables; and the recent surveys of Lieutenants Vanrenen and Burgess have furnished nearly all that was wanting in Moradabad, Bareilly and Bijnour. The Board do not anticipate any final irremediable difficulty.

23rd.—In parts of Goorgaon and Boolundshuhur there were gaps in the records; but these are being supplied, though the Board have not received the Collector's reply in the former case to their last call.

24th.—In conclusion, the Board cannot but express the obligations they are under to the officers of the Canal department, especially Lieutenant-Colonel Cautley, for the great assistance they have received in this work, which is somewhat foreign to their duties as a Board of Revenue. The Deputy Surveyor General has also readily rendered every assistance in his power, though he has been cramped for want of the requisite establishment.

25th.—It was with the desire of relieving the Survey office in Calcutta of the publication of the English, and

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more especially of the Vernacular maps, for which the Deputy Surveyor General had not a sufficiently strong staff, or draftsmen versed in the native languages, that the Board offered, in addition to the general supervision, to undertake the charge of lithographing the maps in the three languages. They believe that there will be far less delay here, than the memorandum shows to have occurred in the Agra and Meerut maps, quite unavoidably in the Survey office.

26*th*.—During the present year, the publication of the maps, which were ready for transfer, and the completion of many, which were still under examination, has been seriously retarded by their retention in Calcutta from February to August. His Honor will observe, from the memorandum, that the maps noted in the margin were forwarded to Calcutta to the Deputy Surveyor General to meet an urgent call of the Railway department, and detained in that department for the period named. This delay was to be regretted ; but it was, the Board believe, unavoidable, and they were anxious to afford every assistance in their power to the Railway office.

Under Examination.

Delhi.	Allygurh.
Furruckabad.	Futtehpore.
Boolundshuhur.	Agra.
Cawnpore.	Mynpoorie.

Ready for Transfer.
Paneeput.

27*th*.—The Board desire me to add that the work in their office, connected with the district maps, has devolved almost entirely upon their Secretary, in addition to duties already sufficiently onerous. Much assistance has been afforded by Mr. Tucker, the draftsman on their establishment.

I have, &c.,

G. J. CHRISTIAN,

Secretary.

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No. VIII.—*From* W. Muir, Esq., *Secretary to the Government of the North-Western Provinces, to* G. J. Christian, Esq., *Secretary Sudder Board of Revenue, North-Western Provinces, No. 2015 A.—Dated 10th October, 1854.*

Sir,—Having laid before the Hon'ble the Lieutenant-Governor your letter No. 684, dated the 12th ultimo, reporting upon the progress made in the construction and publication of district maps, showing village boundaries, I am directed to communicate the following observations and instructions.

2. It is the object of the existing Orders that these maps should be published after the limits of the various jurisdictions in each district have been carefully adjusted, in accordance with the directions laid down in the Resolution of Government, dated the 30th October, 1837. But experience has proved that these provisions cannot generally be effectually carried out, until a map, showing village boundaries, has been constructed, the existing jurisdictions marked out upon it with precise accuracy, and the anomalies and irregularities to be corrected thus clearly brought under review. The Lieutenant-Governor observes that it was with this object the Circular of the Board, J., dated the 8th December, 1848, first desiring the preparation of maps of this description, was issued: and the defective manner in which the Resolution above referred to, of a date so remote as the year 1837, has been hitherto carried into effect, is mainly, it is apprehended, attributable to the absence of such maps, and to the delay, from various causes, experienced in their compilation.

3. As district maps of the above nature have therefore first to be constructed, and the limits of jurisdiction then finally adjusted, His Honor is desirous that arrangements should be made, by which the latter process should be facilitated, and should follow as promptly as possible upon the preparation of each map. The following plan appears to His Honor to be likely to secure this result. When there

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is any near prospect of the map of a district being completed, so as to be ready to be forwarded to the Collector, for a local examination or certificate as to the accuracy of the village boundaries, intimation should be given to the Magistrate and Collector, who will then be desired to bring the existing defects of the arrangement of jurisdiction, and the best mode of obviating them, under immediate consideration. Maps sufficient for the general indication of the rearrangements of jurisdiction, the details of which call for attentive inquiry, must exist in every district, and the anomalies of existing jurisdictions must have frequently forced themselves, in practice, on the notice of the local officers. The Magistrate and Collector will thus be prepared to enter upon the subject, so as to ensure the utmost necessary exactness, on receipt of the village map, which will be sent to him as soon as it has been compiled in skeleton. The whole question of the boundaries of jurisdictions will then come under the best practicable discussion, and if it be found that it can be satisfactorily settled, without much delay, on the basis of the Resolution of 1837, the map will be marked off accordingly; roads, canals, railways, telegraphic lines, &c., subsequently filled in, and the map, thus completed, at once put to press.

4. If, however, it should appear probable that there will from any cause be serious difficulty and delay, either in the correct and final adjustment of jurisdictions, or in obtaining any of the subsidiary information, which it is desirable to exhibit upon the map, the Lieutenant-Governor would not on that account delay its publication. It will, no doubt, be in some degree imperfect; but it will be better to admit such imperfection, than, by indefinitely delaying the publication, to deprive the various branches of the administration of the great assistance and advantages which the possession of any map, showing correctly village boundaries and existing jurisdictions, affords. Such benefits the Lieutenant-Governor believes to be cheaply pur-

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chased at the comparatively trifling expense of an edition, even if it is eventually to be superseded by an improved and completer map, to be published *de novo* on all the needful details being eventually supplied.

5.—The Lieutenant-Governor requests that the Board will act upon the principles above indicated, and report, from time to time, the names of the districts, of which the maps are in such a state of forwardness that the adjustment of the limits of their jurisdictions has become a matter for early consideration.

6.—The Lieutenant-Governor will himself discuss, with the local authorities of such districts, all questions bearing on the most appropriate and convenient arrangement of jurisdictions, when his annual tour may afford him the facility of doing so. He proposes, at an early date, thus to examine the details of any such questions pending in the districts of the Rohilcund division.

7.—Wherever such difficulties or delays, as are contemplated above, occur, the Board are requested to report the circumstances for the information of the Government, with a view to the determination of the question whether the map shall be immediately printed, or its publication postponed for the more complete adjustment, or the entry of more detailed information, than it may be practicable at once to obtain.

8.—The Lieutenant-Governor is very sensible of the highly valuable care and labour which the Secretary of the Board has given to the preparation of the village maps. The best acknowledgments of the Government are due to that Officer for his efficient attention to the subject. And the Lieutenant-Governor will be glad to receive from him any further suggestions which may seem to him calculated to promote the object of the present instructions.

I have, &c.,

W. MUIR,

Secy. to Govt. of the N.-W. P.

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No. IX.—*From* W. MUIR, ESQ., *Secretary to Government, N. W. Provinces, to* SUDDER BOARD OF REVENUE, *N. W. Provinces, No. 2192 A.—Dated Head-quarters, Revenue Department, the 27th October, 1854.*

THE Lieutenant-Governor having had under his consideration the several district maps, showing village boundaries which have, up to the present date, been published by the Deputy Surveyor General, or by the Board, observes that these maps have not been colored upon any uniform principle.

2nd.—The following appear to have been the rules followed in the coloring of each map:—

MAP OF ETAWAH.—Colored by moonsiffees, tehseeldarees and thannahs, the tehseeldarees being divided by a line of the same color as that of the moonsiffee in which they are contained; and, where a tehseeldaree contains two or more thannahs, the boundaries of the latter being distinguished by a yellow shading.

MAP OF SEHARUNPORE.—This map is apparently colored by pergunnahs; the limits of moonsiffees, tehseeldarees and thannahs have not been distinguished.

MAP OF MOZUFFURNUGGUR.—This map appears to have been colored on the same principle as that of Seharunpore.

MAP OF ROHTUK.—This district comprises but one moonsiffee. The coloring is by pergunnahs. In one instance (Mehim), in which a pergunnah is divided into two thannahs, the division is shown by a line of the same color as that of the pergunnah; but where two or more pergunnahs form one thannah or one tehseeldaree, the limits of such thannah or tehseeldaree are not indicated by the coloring.

MAP OF MEERUT.—The coloring of this map is by tehseeldarees, and the pergunnah boundary is denoted by a dotted, but uncolored line. Where a thannah comprises two or more pergunnahs, its limits are not shown by the coloring; nor are the moonsiffees distinguished on the face of the map.

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MAP OF MUTHRA.—The coloring is by tehseeldarees, of which each forms a pergunnah. Where the tehseelee is divided into two thannahs, the thannah boundary is shown by a partition line of the same color as that of the tehseeldaree. The moonsiffee divisions are not shown by the coloring.

MAP OF HISSAR.—The coloring is by pergunnahs. Where a tehseeldaree or thannah comprises two or more pergunnahs, the thannah and tehseeldaree outlines are not shown by any distinct color.

THE MAP OF JULLUNDER—Is colored, like that of Muthra, by pergunnahs, of which each forms a tehseeldaree, the internal thannah sub-divisions being indicated by a line of the tehseeldaree color.

3rd.—The Lieutenant-Governor regards it as of great consequence, that the series of maps now in course of publication should be colored upon an uniform system; and that the plan which may be adopted should show, as far as possible, by the coloring, and without reference to the table of divisions, the several jurisdictions, civil, revenue, and criminal. It occurs to the Lieutenant-Governor that, as the tehseeldars throughout these Provinces are now generally invested with the powers of Officers of Police, and as each tehseeldaree division, in almost all cases, constitutes either a complete thannah, or contains within it two or more complete thannahs, it will be the most convenient and useful plan to constitute the tehseeldaree, which is thus at once a revenue and a police division, the unit in the system; so that each tehseeldaree shall have a separate color. In this case the pergunnah and thannah boundary might be denoted respectively by a single and double line of the same color as the tehseelees within which they are comprised.

4th.—The moonsiffee limits might likewise be exhibited by a distinct color, appropriated to the purpose of distinguishing the civil jurisdictions.

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5th.—The Lieutenant-Governor will be glad to receive from the Board their views upon the subject, after careful consideration, and communication with their Secretary, under whose superintendence, mainly, the preparation of the maps is now being carried on.

I have, &c.,

W. MUIR,

Secy. to Govt. of the N. W. P.

No. X.—*From* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue, Agra, to* W. MUIR, ESQ., *Secretary to the Government of the N. W. P., No. 866.—Dated Agra, the 7th of November, 1854.*

REVENUE.

Present:
E. A. READE, ESQ.,
Member.

SIR,—I am desired by the Sudder Board of Revenue to acknowledge the receipt of your letter, No. 2192 A., dated 27th October, 1854, regarding the rule to be observed in coloring the district maps now under publication, or compilation in their office.

2nd.—Eight district maps are alluded to in your second paragraph. Of these three,—viz., the maps of Etawah, Seharunpore and Mozuffurnuggur, were published before the issue of the minute of His Honor the late Lieutenant-Governor, dated 8th March, 1852, by which the superintendence of the work of compilation, examination and publication of this series of maps, was entrusted to the Secretary of the Board. Up to that time no rule had been laid down, nor any fixed principle observed, in the coloring of the maps, nor indeed was much attention paid to their accuracy in other respects.

3rd.—The coloring of these maps, therefore, was not made on the same principle. The map of Seharunpore was colored by pergunnahs, but the limits of those pergunnahs not having been previously re-cast, the map, though beautifully executed, is useful only as showing how much

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remains to be done in adjusting the limits of pergunnahs and jurisdictions; and even had the boundaries of the former been correct, the want of a marginal memorandum of the latter would have very much lessened the value of the map.

4th.—The map of Mozuffurnuggur was colored also by pergunnahs, of which there are seventeen. But here also the marginal memorandum of jurisdictions has been omitted, and there is nothing to show how the seventeen pergunnahs are distributed into thannahs, tehseeldarees and moonsiffees. The boundaries of the pergunnahs themselves, however, are correct.

5th.—In the map of Etawah, in which district there are six pergunnahs, each being a tehseeldaree, an attempt has been made to show, by colors, the limits of tehseeldarees (in this case identical with pergunnahs,) thannahs and moonsiffees. But even with the aid of a memorandum of jurisdictions, the map is scarcely intelligible, and there is nothing to show that the pergunnahs and tehseeldarees are identical, which they are.

6th.—The maps of Hissar, Rohtuk and Muthra, which were published, the two former at Agra, and the last-named at Calcutta, after final examination in this office, have been colored on one principle expressed in the following rule:—

"The map should be colored by pergunnahs, the distri-
"bution of these into thannahs, tehseeldarees and moon-
"siffees, being shown by a tabular memorandum in the
"margin. Wherever the boundary of a thannah crosses
"a pergunnah, it should be shown by a *band* of the color
"adopted for that pergunnah."

This rule will be found to agree in principle with that given in paragraph 5 of the *instructions* contained in the memorandum, dated 5th March, 1852, already referred to.

7th.—Thus in Hissar there are ten pergunnahs, and these in the map are shown by different colors. Their

distribution is indicated at a glance, by marginal memorandum, copy of which is subjoined :—

The Tehseeldarees of	Comprises the *Pergunnah of*	Comprises the *Thannah of*	Comprises the *Moonsiffee of*
Hansie, ...	Hansie, ...	Hansie, ...	Hissar.
Hissar, ...	Hissar, ...	Hissar, ...	
Tosham, ...	Tosham, ...	Tosham, ...	
	Sewanee, ...	Sewanee, ...	
	Buhul, ...		
Barwala, ...	Barwala, ...	Barwala, ...	
	Tohana, ...	Tohana, ...	
Futtehabad, ...	Futtehabad, ...	Futtehabad, ...	
	Ugroha, ...		
	Ruttees, ...	Ruttees, ...	

It so happens that in this district each thannah comprises one or more entire pergunnahs, so that the necessity of showing the limits of one of the former by a *band* of the pergunnah color did not occur.

8*th*.—But in Rohtuk it did. That district contains seven pergunnahs, distributed as shown in the marginal memorandum, a copy of which follows :—

Tehseeldarees.	Comprises the *Pergunnah of*	Comprises the *Thannah of*	Comprises the *Moonsiffee of*
Rohtuk, ...	Rohtuk, ...	Rohtuk, ...	Rohtuk.
	Beree, ...	Beree, ...	
Muhim, ...	Muhim, ...	Muhim, ...	
		Kulanore, ...	
	Bhuwanee, ...	Bhuwanee, ...	
Gohana, ...	Gohana, ...	Gohana, ...	
Sampla, ...	Khurkhonda,...	Sampla, ...	
	Mandouthoe,...		

It will be observed that pergunnah Muhim comprises the two thannahs of Muhim and Kulanore, and a *band* of the pergunnah color marks their boundary. There is this peculiarity in the map of Rohtuk,—that certain mouzahs belonging to Independent States, but managed by the British Government, are washed with the color of the pergunnah to which, for this purpose, they are attached, and in which they lie.

9*th*.—The same rule has been followed in the map of Muthra, in which district it so happens that each of the nine pergunnahs is in itself a tehseeldaree. But had it been otherwise, the coloring would not have been affected, but only the marginal memorandum of jurisdictions. Two instances, of a thannah boundary crossing a pergunnah, occur in this map, as pergunnah Muthra contains two thannahs, Muthra and Bindrabun, and pergunnah Maat two also, Maat and Raguh.

10*th*.—The map of Meerut would also have been colored by pergunnahs, had the Deputy Surveyor followed the instructions contained in paragraphs 2 and 3 of the Board's letter No. 177, dated 15th July, 1853, which are quoted in the margin. But from unavoidable circumstances a delay of upwards of a twelvemonth took place in his office, and the map was finally struck off, without the submission of proofs for examination and correction here, and the inaccurate coloring of the Collector by tehseeldarees has been followed. The Deputy Surveyor General, in a letter No. 1088, dated 25th October, 1854, reports that out of 200 copies, 94 remain uncolored, of which 50 have been despatched to your address. The Board suggest that some of these should be colored, according to the rule above given, by pergunnahs. The map of Meerut has a marginal memorandum of juris-

Para. 2nd.—The Board request that you will cause this map to be lithographed as soon as practicable, and forward to them the usual number of proof copies for examination.

Para. 3rd.—You will observe that the map has been colored, to show tehseeldarees instead of pergunnahs; but this mistake will be rectified in this office, on the receipt of the proofs.

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dictions, which was compiled in this office, but which is of little use, unless the limits of the pergunnahs are colored; as the dotted lines are not easily distinguished.

11*th*.—The map of Jullundur was published without reference to this office. But the limits of the several pergunnahs and jurisdictions in that district were arranged by the present Secretary of the Board, when Settlement Officer, Trans-Sutlej States, and a rough map prepared by him for the guidance of the surveyor. The rule above given has therefore been followed. This district includes four Khalsa pergunnahs, each of which is in itself a tehseeldaree, and two pergunnahs of the Aloowala Jageers, with the internal arrangements and divisions of which the British Government have no concern. It will be observed that the coloring is by pergunnahs, and in each pergunnah the limits of included thannahs are shown by a *band* of the pergunnah color.

12*th*.—The Board, with reference to paragraphs 3 and 4 of your letter under reply, would respectfully suggest that no change be made in the rule at present adopted. It appears to them that the pergunnah has been properly regarded as the unit in the Resolution of Government, dated 30th October, 1837, (Appendix VI., Directions to Settlement Officers,) and according to the instructions therein contained, the limits of pergunnahs are to be adjusted, and, if necessary, re-cast before any steps are taken to form fiscal, criminal, or civil jurisdictions, which are best made by grouping entire pergunnahs, with occasionally the division of pergunnah, into one or more thannahs.

13*th*.—In all fiscal matters, such as the collection of revenue, the arrangement of records, and the formation of tehseeldarees, everything is, or should be done, pergunnahwar, the unit of all such arrangements being, with rare exceptions, the mouzah and the pergunnah.

14*th*.—And wherever the principles of the Government Resolution, above quoted, have been, or can be carried out,

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each tehseeldaree will include one or more entire pergunnahs, as well as one or more entire thannahs; and the limits of the thannahs will, with rare exceptions, correspond with, or be included in, those of the pergunnahs. The adoption therefore of the latter, as the unit of color, will equally suit the criminal jurisdiction.

Vide Para. 21, Appendix VI., Directions to Collectors.

15*th.*—Each moonsiffee should comprise one or more entire tehseeldarees, and therefore one or more entire pergunnahs, and the same remark applies.

16*th.*—The Board believe that a map, colored pergunnahwar, with *bands* of pergunnah colors, where necessary for the boundaries of thannahs crossing a pergunnah, with a marginal memorandum of jurisdictions, will be far more generally convenient than any other method.

17*th.*—Occasionally an officer may, for special reasons, desire a map differently colored, so as to show tehseeldarees only, or thannahs only, or moonsiffees only, or to accompany a report on population, irrigation, or any general subject. For this reason the Board, in the maps published under their superintendence, leave a certain number of copies uncolored, as per margin.

		Copies.
English Maps,	...	200
Colored,	...	150
Uncolored,	...	50
Vernacular Maps,	...	300
Colored,	...	250
Uncolored,	...	50

I have, &c.,

G. J. CHRISTIAN,

Secretary.

No. XI.—*From* W. MUIR, ESQ., *Secretary to Government, North-Western Provinces, to* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue, Agra, No. 2371 A.—Dated Camp Hudruck, the 27th November, 1854.*

Revenue Department.

I AM directed to acknowledge the receipt of your letter, No. 866, dated 7th instant, replying to the remarks of the Lieutenant-Governor, regarding the rule observed in coloring the district maps in course of publication.

2. In reply, I am desired to observe that the Lieutenant-Governor would have preferred, had no previous fixed rule been laid down, to follow the principle of coloring proposed in my letter, dated the 27th ultimo; but as the system explained in your letter has been already authoritatively sanctioned and acted upon, His Honor does not see sufficient reason for directing a change as to the maps which still remain to be issued.

No. XII.—*From the* DEPUTY SURVEYOR GENERAL, *to the* SECRETARY TO GOVERNMENT, *North-Western Provinces, No. 6, Revenue Department.—Dated Calcutta, the 11th November, 1854.*

I HAVE the honor to acknowledge the receipt of your letter, No. 2193 A., dated 27th ultimo, forwarding for my information copy of a letter addressed to the Secretary, Sudder Board of Revenue, and requesting my opinion as to the most suitable and uniform plan, for the future coloring of the North-West district maps, under compilation by the Local Officers, on the scale of 2 miles to the inch, showing village boundaries.

2.—With maps not compiled by ourselves, it is, I beg to state in reply, the invariable practice of this office always to color them in strict conformity with the originals furnished, and unless specially ordered, no deviation is permitted from the coloring denoted on the original ma-

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nuscript. This will in some measure account for the great dissimilarity observed in the coloring of the lithographed maps alluded to, all prepared by different parties, which, as His Honor justly observes, have not been followed upon any uniform principle.

3.—Adverting to the 3rd paragraph of your letter to the Sudder Board of Revenue, I entirely concur with His Honor the Lieutenant-Governor that, as each tehseeldaree division, in almost all cases, constitutes either a complete thannah, or contains within it two or more complete thannahs, it would be the most convenient and useful plan to constitute the tehseeldaree, which is thus at once a Revenue and a Police division, *the unit* in the system, so that each tehseeldaree shall have a separate color, and which has already been shown on the copies furnished to the North-Western Government, with my letter No. 49, dated 23rd September. The pergunnah boundaries can very easily be shown by taking the same color with which the tehseel boundary is colored, and edging it slightly on the pergunnah boundary, which is already marked off on these maps, noting the change in the references, which, at a glance, will not only show each pergunnah boundary separately and distinctly, but at the same time will clearly define the number of pergunnahs comprising a tehseeldaree. A colored lithographed impression of the Meerut map, showing the style of coloring pergunnah and tehseeldaree boundaries, as above described, is herewith enclosed for His Honor's inspection.

4.—With reference to delineating the Moonsiff's jurisdiction, as well as the thannah boundary, by color, over a map already colored, and showing all the criminal and fiscal boundaries at one glance, it strikes me that the moonsiffee jurisdictions had better be shown, for the sake of perspicuity, in the column of references only. By attempting too much, any coloring beyond the minor subdivisions of thannahs, tehseels and pergunnahs, would

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confuse the map, and tend to defeat the very object desired;—namely, simplicity and intelligibleness. With a view, however, of giving the suggestions of His Honor, as contained in the 3rd and 4th paragraphs of your letter to the Sudder Board of Revenue, a practical demonstration, I have attempted, on one of the lithographed impressions of the Meerut map, (which is also forwarded for His Honor's inspection,) to show, by color, all the four jurisdictions; viz., pergunnahs, tehseeldarees, thannahs and moonsiffees, but which is by no means clear or intelligible; and I doubt if it would be comprehended by the ordinary observer. The three grand yellow divisions are meant to represent the jurisdiction of the three respective moonsiffees, which in this case has been made the unit, or basis in the system. The green wash defines the jurisdiction of the tehseeldar, whilst thannah and pergunnah boundaries are shaded by blue and pink respectively. Such a mode of coloring, it appears to me, would be wanting in perspicuity, whilst the tabular statement on the Map A. gives a clear and ready indication of the moonsiffees, and leaves the body of the map clear and decided.

No. XIII.—*From the* SECRETARY TO GOVERNMENT, *North-Western Provinces, to the* DEPUTY SURVEYOR GENERAL, *No. 4995, Revenue Department.—Dated Calcutta, the 19th December, 1854.*

I AM directed to acknowledge the receipt of your letter dated 11th ultimo, No. 6, relative to the best mode of coloring district maps, showing village boundaries.

2. The Lieutenant-Governor desires me to express his thanks for the useful statement of your opinion offered in this letter. You will observe, however, from copies of the correspondence enclosed, that the subject has now been finally disposed of, with reference to the Board's report of the orders which had been issued by the late Lieutenant-Governor.

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No. XIV.—*Letter from the* DEPUTY SURVEYOR GENERAL *to the* SECRETARY TO GOVERNMENT, *North-Western Provinces, No. 12.—Dated 8th December, 1854.*

I HAVE the honor to acknowledge the receipt of your letter No. 2016, dated the 11th October last, forwarding copies of correspondence regarding the construction and publication of district maps, showing village boundaries, for any remarks which I might have to offer thereon; and in reply to state that there appears but little to add on this subject, which has already caused a very voluminous and protracted correspondence.

2. The task of superintendence over the compilation of these maps has now been entrusted to very able hands, and doubtless all will be done, which it is possible for an officer so situated to effect. But it cannot be concealed that such a difficult and important work obviously demanded a distinct and special establishment, with competent and responsible professional superintendence for its execution from the beginning; and it is even now to be feared that, although the maps so produced are most useful and valuable, in a Revenue point of view, still the results cannot be so satisfactory for geographical purposes as could be desired, inasmuch as their construction is not based on proper professional principles, from the numerical data furnished by the survey.

3.—The remarks of the Secretary of the Board, regarding the small share this office has had in this matter, and with special reference to the Agra map, requires a slight explanation. Whatever compilation work has been effected here, has been simply done from the pergunnah maps, as prepared at the time of survey, and which are notoriously defective and incomplete. The omissions alluded to were probably the names of the small *dakhilee* villages, which, from over-crowding the map, are frequently rejected. The errors of boundary are attributable to the reductions made by pentagraph only twice over, from imperfect copies of

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pergunnah maps, and absence of the village maps as standards for comparison.

4. No original village plans, and no numerical data whatever, exist in Calcutta; rigorous work could not therefore be expected; and it was on this special account that I was compelled to declare to the late Lieutenant-Governor my utter inability to undertake the compilation of the series of North-Western Province districts, simply from want of the proper materials and already overtaxed establishment. My opinion on this question generally will be found fully detailed in the communications noted in the margin.

Deputy Surveyor General, to Secretary to Government; Annual Report for 1850-51, No. 30, 21st May, 1852, paragraphs 28 and 29; No. 319, 2nd July, 1851, paragraph 3rd; No. 325, 18th August, 1851.

5. From the unfortunate state of the original records of the surveys of the North-Western Provinces, none having ever been lodged in this department, and from the want of proper maps being compiled on a tangible scale at the time of survey, owing to the extraordinary and lamentable haste with which the surveyors were permitted to slur over their work, very few really good maps, fit for practical purposes, exist; and now that the railway operations are progressing so rapidly, it is of the very first importance that the series of maps now in hand should be completed as fast as possible: and I would therefore venture respectfully to remark that this end cannot be attained without a corresponding expenditure. If an establishment of compilers and draftsmen, with an experienced Assistant Surveyor to guide them, is entertained and placed under Mr. Christian's superintendence, there may be some hope of getting the work out of hand within a moderate period, instead of in nine or ten years,—the time recently estimated for its completion, and before the expiration of which a new survey will be required.

6. The object aimed at seems to me to be fully worthy of increased exertions being made. The time already

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occupied in the production of the very few districts published, is out of all proportion to the results, when we consider that the survey on which the work depends was executed many years ago, and is therefore available for every district simultaneously. Although the survey of the Bengal Province is only half done, still the maps showing village boundaries are extant for almost every district surveyed on the large scale of one inch to the mile; and we may reasonably anticipate that both the survey and the publication of the maps of the remaining districts will be completed before the compilation of the North-Western Provinces are got out of hand, unless something is now done, such as I have ventured to recommend.

7. It should also be borne in mind that the map is fit for all practical purposes, when the external limits of the district are finally fixed and defined, and the *village* boundaries and topographical details of the interior are laid down. For the revision and adjustment of the sub-division boundaries of tehseels, pergunnahs or thannahs, the publication of the map should in nowise be detained, because the definition of such boundaries can be provided for as well, if not better, on the lithographed, as on the original manuscript map. I believe it is the various questions affecting these internal sub-divisions, which in a great measure detain the map, and thus deprive the whole service and the public, for unlimited periods of maps which in the present day are a positive necessity. The outer boundary of the district, therefore, should be first considered, and settled beyond all doubt; and the canals, roads and other topographical details, having been inserted and checked by the several departments as at present, the map should be sent to Press, and lithographed copies furnished to the local authorities, for the purpose of marking off their several minor jurisdictions, which may then be performed at the most perfect leisure, without inconvenience and delay to the public service in general.

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8. For the preparation of the last edition of the 4-mile, or Geographical Maps of the North-Western Provinces, the Government of India sanctioned a special establishment of Rs. 300 per mensem under my predecessor. The 2-mile maps are more formidable in the ratio of 4 to 1. I therefore submit, that it is in vain to expect such an undertaking to be completed in a time to be of any use, except by full and efficient means being granted for the express purpose.

No. XV.—*Orders of Government, North-Western Provinces, to the Deputy Surveyor General, No. 132 A., dated 11th January, 1855.*

I AM directed to acknowledge the receipt of your letter dated 8th ultimo, No. 12, offering remarks relative to the construction and publication of district maps showing village boundaries.

2. In reply, I am desired to observe that the Lieutenant-Governor apprehends that the earlier professional records are generally too imperfect and inaccurate to make it advisable to attempt to complete the maps, now in course of publication, with anything like entire exactness from the existing materials; and it appears to him, therefore, after a careful consideration of your suggestions, that there are not sufficient grounds for recommending to the Supreme Government the employment of a special professional establishment, at a necessarily considerable charge for the purpose.

3. A copy of the correspondence will be sent to the Board, with a request that they will report whether the materials for the compilation of the remaining maps can be collected at a sufficiently early date to render it advantageous to sanction the engagement of more than the present two draftsmen allowed to their office for this duty. Undoubtedly as many draftsmen as there is matter prepared for, ought to be employed together in the Board's establishment, so that the delay in the issue of the entire series of maps may be abridged as much as possible.

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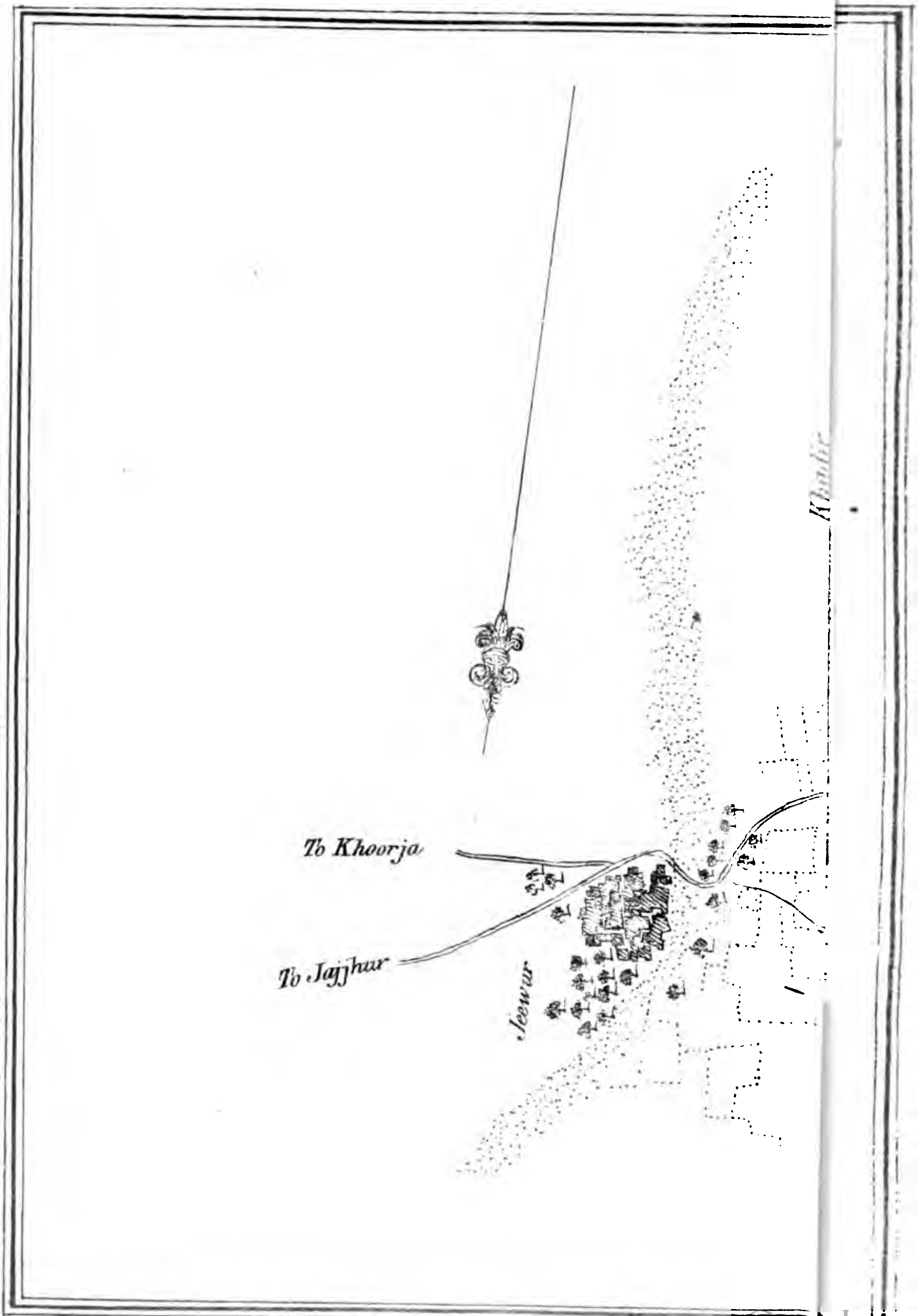

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No. 7.

NOTE ON THE DECREASE IN THE NUMBER OF WELLS IN THE AGRA DIVISION.

NOTE *on the Decrease in the number of Wells, since the Settlement under Regulation IX. of 1833, in the districts of Muthra, Agra, Mynpoorie and Etawah, in the Agra Division, drawn up by* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue.*

THE enquiry, which has disclosed the fact that the number of wells has decreased since the records of the Settlement under Regulation IX., 1833, were prepared in the several districts of Muthra, Agra, Mynpoorie and Etawah, in the Agra Division, was commenced under the instructions contained in the subjoined orders of Government, No. 2801, dated 30th August, 1849:—

" The Lieutenant-Governor is desirous of obtaining more distinct information than he at present possesses, as to the degree in which the determination of the Government assessment, for an extended term of years, has led to the expenditure of capital upon the improvement of the cultivation. It appears to His Honor that a judgment may be most easily formed upon this point, by ascertaining the number of pucka wells which have been sunk for the purpose of irrigation since the completion of the Settlement. Such a return may be easily furnished by each tehseeldar, on enquiry from the putwarees, tested by the other means at his disposal. The Board are therefore requested to call upon the several Collectors to supply the required information in the annexed form. When all the returns are received, they may be forwarded to this office, together with an abstract, showing the total number of wells in each district and division at the time of settlement, and the number which have been sunk since. As some wells are constantly falling in from age or acci-

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dent, a column has been added, to show the number which have thus become unserviceable."

(Signed) J. THORNTON,
Secy. to the Govt. of the N. W. P.

Register of Pucka Wells used for irrigation in the District.

1.	2.	3.		4.		5.		6.	
Per-gun-nah.	*Year in which the Settlement of the Pergunnah was completed.*	*Number of Pucka Wells in use in that year.*		*Number of Pucka Wells sunk since that year to the end of 1848-49.*		*Number of Pucka Wells that have become totally unserviceable since the year of Settlement.*		*Number in use at the end of 1848-49.*	
		Wells.	Laos.	Wells.	Laos.	Wells.	Laos.	Wells.	Laos.

N. B.—The Returns required by the Collectors from the Tehseeldars should give the above information for each village, but a pergunnahwar statement will suffice for transmission to the Board.

A Circular Order, calling for the information required, was issued by the Sudder Board of Revenue to the Commissioners of the Delhi, Meerut, Rohilcund, Agra, Allahabad and Benares Divisions, and on the 13th August, 1850, the following abstract of the returns received was submitted to Government:—

Division.	*District.*	*Number of Pucka Wells in use in the year of Settlement.*		*Number of Pucka Wells sunk since that year to the end of 1848-49.*		*Number of Pucka Wells that have become totally unserviceable since the year of Settlement.*		*Number in use at the end of 1848-49.*	
		Wells.	Laos.	Wells.	Laos.	Wells.	Laos.	Wells.	Laos.
DELHI.	Paneeput, ...	4,371	2,204	448	362	252	190	4,567	2,376
	Hissar, ...	130	138	22	24	5	5	147	157
	Delhi, ...	1,766	1,853	127	133	144	145	1,749	1,841
	Rohtuck, ...	254	291	26	30	14	14	266	307
	Goorgaon, ...	4,616	5,942½	664	970	403	438	4,877	6,474½
	TOTAL, ...	11,137	10,428½	1,287	1,519	818	792	11,606	11,155½
MEERUT.	Dehra Dhoon, ...	0	0	0	0	0	0	0	0
	Seharunpore, ...	2,634	688	623	199	301	62	2,956	825
	Mozuffurnuggur,	6,091	7,365	487	631	634	625	5,944	7,371
	Meerut, ...	5,620	8,647	1,392	2,218	484	596	6,528	10,269
	Boolundshuhur,	7,489	12,165	2,321	4,219	1,495	1,984	8,315	14,400
	Allygurh, ...	11,739	26,606	2,197	5,251	2,938	7,473	10,998	24,384
	TOTAL, ...	33,573	55,471	7,020	12,518	5,852	10,740	34,741	57,249

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Division.	District.		Number of Pucka Wells in use in the year of Settlement.		Number of Pucka Wells sunk since that year to end of 1848-49		Number of Pucka Wells that have become totally unserviceable since the year of Settlement.		Number in use at the end of 1848-49.	
			Wells.	Laos.	Wells.	Laos.	Wells.	Laos.	Wells.	Laos.
ROHILKUND.	Bijnour, ...	...	0	0	0	0	0	0	0	0
	Moradabad,	...	0	0	0	0	0	0	0	0
	Budaon, ...	...	466	708	186	840	70	129	582	919
	Bareilly, ...	...	0	0	0	0	0	0	0	0
	Shahjehanpore,	...	0	0	0	0	0	0	0	0
	TOTAL,	...	466	708	186	840	70	129	582	919
AGRA.	Muthra, ...	...	6,601	18 941	916	2,243	1,908	4,857	5,609	11,327
	Agra, ...	..	8,0[illegible]	15,640	585	1,290	2,509	4,794	6,07[illegible]	12,126
	Furruckabad,	...	548	1,112	249	611	99	154	69[illegible]	1,569
	Mynpoorie,	...	11.186	27,471	1,103	2,962	8,119	6,843	9,17[illegible]	23,590
	Etawah, ...	...	1,504	3,155	256	589	548	1,103	1,21[illegible]	2,591
	TOTAL,	...	27,842	61,319	3,109	7,635	8,183	17,751	22,768	51,203
ALLAHABAD.	Cawnpore, ...	...	3,634	9,214	608	1,55[illegible]	614	1,320	3,62[illegible]	9,445
	Futtehpore,	...	6,854	20,706	869	3,047	700	1,304	7,023	22,449
	Humeerpore,	...	2,5[illegible]5	161	123	1	351	79	2,337	83
	Banda, ...	...	876	1,098	24	30	21	27	879	1,101
	Allahabad, ...	...	5,705	9,954	1,417	3,208	842	238	6,780	12,924
	TOTAL,	...	19684	41,133	3,041	7,837	2,028	2,968	20,647	46,[illegible]02
BENARES.	Goruckpore,	...	32,845	0	11,096	0	2,304	0	41,637	0
	Azimgurh,	...	14,462	17,327	4,004	4,797	1,5[illegible]5	1,628	16,961	20,496
	TOTAL,	...	47,307	17,327	15,100	4.797	3,809	1,628	53,598	20,496

ABSTRACT.

Division.		Number of Pucka Wells in use in the year of Settlement.		Number of Pucka Wells sunk since that year to end of 1848-49.		Number of Pucka Wells that have become totally unserviceable since the year of Settlement.		Number in use at the end of 1848-49.	
		Wells.	Laos.	Wells.	Laos.	Wells.	Laos.	Wells.	Laos.
Delhi,	...	11,137	10,428½	1,287	1,519	818	792	11,606	11,155½
Meerut,	...	33,573	55,471	7,020	12,518	5,852	10,740	34,741	57,249
Rohilkund,	...	466	708	186	340	70	129	582	919
Agra,	...	27,842	61,319	3,109	7,635	8.183	17,751	22,76[illegible]	51,203
Allahabad,	...	19,634	41,133	3,041	7,887	2,02[illegible]	2,968	20,647	46,002
Benares,	...	47,307	17,327	15.100	4,797	3,[illegible]09	1,628	58,598	20,946
TOTAL,	...	1,39,959	1,86,336½	29,743	34,646	20,760	34,008	1,48,942	1,87,024

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This statement elicited the remark conveyed in Mr. Secretary Thornton's letter, No. 2845, dated 18th September, 1850, "that though the number of wells constructed since the settlement is considerable, yet the general result, after deducting those which are reported to have become unserviceable, is not so favorable as was anticipated."

Subsequently the Court of Directors, in paragraph 16 of their Despatch No. 13, dated 15th September, 1852, observed :—" In the Agra Division, we lament to observe there has been a decrease of 5,074 wells, and we desire that the cause of this large decrease should be ascertained and reported to us."

In pursuance of these orders, the Commissioner of the Agra Division was instructed to call upon the Collectors of the several districts abovenamed, to report upon the causes of the marked decrease in the number of serviceable wells; but owing to delay in the district of Agra, the replies of the Collectors were not submitted to the Board till the beginning of 1854, when Mr. W. H. Tyler, Commissioner of the Agra Division, in his letter No. 50, dated 8th February of that year, remarked as under.

" *2nd.*—The Collector of Muthra reports that the returns formerly made have been found to be quite correct. He states that the tehseeldars and others, conversant with the agricultural statistics of the district, universally attribute the abandonment of old pucka wells, and the disinclination to expend money in the construction of new ones, to the fact of water having been found at a much greater depth from the surface, ever since the year of drought 1837-38, in which year, it is reported that the springs of many of the old pucka wells became dry, and no issue of water having been since found, the wells have been abandoned as unserviceable, and incapa-

MUTHRA.

No. of wells in the year in which the Settlement was made, ...	6,601
No. in use at the end of 1848-49,	5,609
Decrease, ...	992

ble of restoration. The Collector gives credit to the reason offered as the correct one, particularly as the comparative statement of the general irrigated cultivated surface of the country would show increase, rather than decrease, which arises from the practice, which has become more general, of sinking kutcha wells, in preference to pucka wells, the cost of sinking the former being more certain, and the risk less, where the sinking may fail.

3rd.—The Collector of Agra reports that the former returns have undergone a thorough re-examination by the village putwarees, checked by efficient superintendence, and the result is embodied in a revised return, which accompanies his report, and shows considerable error in the previous returns. The revised returns show that the number of wells at settlement should have been 7,978, and the number at the end of 1848-49, 5,928 ; *i. e.*, a decrease of 2,050 wells, instead of 1,924, the number entered in the former statement. With regard to the decrease, the Collector states that it is universally assigned by the tehseeldars and others, to the water having receded from the surface, and from the masonry cylinders, which sufficed while the spring was more near; having proved too short, now that it has receded 7, 10, and 13 cubits. From this cause the cylinders are either left dry at bottom, or contain insufficient water for purposes of irrigation, and then are allowed to fall into disuse and decay. This recedence, the Collector reports, is generally stated by the people to have taken place within the last twelve or fifteen years, or since the famine of 1837-38, and is by them attributable to deficient rains.

AGRA.	
No. in the year of Settlement, ...	7,978
No. in use at the end of 1848-49,	5,928
Decrease, ...	2,050

4th.—The Collector, although satisfied that the springs are materially affected by even one year's drought, is not disposed to refer the general recedence of the water-

level to the brief period to which it is usually assigned, but is inclined to think that the recedence has been gradually increasing for many years. He is unable to determine from what cause this has arisen, but is disposed to account for it in some degree to the great extension of ravines along the course of the Jumna and the minor streams, which form the drainage of the country.

5th.—The Collector has submitted a statement, No. 2, furnishing particulars of the present average spring depth for the seven pergunnahs.

6th.—Mr. Gubbins states in paragraph 11 of his report the causes which have operated hitherto to prevent the restoration of so many pucka wells. He now advocates the repair of the old pucka wells, and details in paragraph 8, at considerable length, the three methods by which the repair of old pucka wells might be effected; and in paragraphs 23 to 27, he brings to notice the great evil which arises from the great increase of unserviceable wells, and submits suggestions for remedying it, and solicits authority, if his suggestions meet the approval of superior authority, to commence immediately remedial measures in accordance with them. The suggestions offered by Mr. Gubbins are, I think, most useful, and I beg to recommend that he be authorized to introduce them into the Agra district; and I would suggest that a copy of Mr. Gubbins's report be forwarded to the several Collectors, with the view of eliciting further facts and suggestions for the sinking of wells, and the repairing of those pucka wells now unserviceable, which will admit of restoration.

7th.—The Collector of Mynpoorie states, that he has no reason to doubt the accuracy of the return of wells formerly submitted, and that he believes that in reality wells have fallen off, in consequence of want of rain during the years of famine,

MYNPOORIE.	
No. in the year of Settlement, ...	11,186
No. in use at the end of 1848-49,	9,170
Decrease, ...	2,016

and bad years subsequent to it. He adds that there is no doubt of the fact that the soil of the Mynpoorie district does not contain the same depth of moisture which it did prior to the year 1837, and that this is proved by the fact that the Esun nuddee, which always contained a considerable body of running water throughout the hot season before that year, has since become nearly dry, two months after the rainy season.

8th.— The Collector of Etawah states that the register submitted by his predecessor appears to have been correctly compiled, and

ETAWAH.		
No. in the year of Settlement,	...	1,504
No. in use at the end of 1848-49,	...	1,212
Decrease,	...	292

that the decrease in the number of wells in use in 1849, as compared with the number at the time of settlement, is to be attributed to those wells which had run dry, or had not a sufficient quantity of water for purposes of irrigation, being included in the returns prepared at the time of settlement, and excluded from the register compiled in 1849, as being unfit for irrigation. This information is said to have been obtained through the tehseeldars, after minute enquiries had been made from the putwarees, and from other residents of the villages."

The following extracts are from the Report No. 270, dated 17th September, 1853, from Mr. M. R. Gubbins, Collector of Agra, which was enclosed in Mr. Tyler's letter, above quoted:—

" *3rd.*—There can I think be no doubt as to the truth of the fact, which is universally assigned by the tehseeldars and others, as the reason for the decay of pucka wells; viz., that the water has receded from the surface, and that the masonry cylinders, which sufficed while the spring was more near, prove too short, now that it has receded seven, ten, and thirteen cubits. The cylinders are either left dry at bottom, or contain insufficient water for purposes of irrigation, and then fall into disuse and decay.

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4th.—This recedence of the water is generally stated by the people to have taken place within the last twelve or fifteen years, or since the famine of 1837-38, and is by them attributed to deficient rains. They assert that much less rain has fallen of late years than used to fall before, and refer the greater depth of the spring to this cause.

5th.—The increased depth of the spring (termed here "*soth*" or "*sehja*,") is I think a fact sufficiently evidenced by the condition of almost all—(I do not know but that I may say *all*)—the old pucka wells in this part of the country. There are several thousand old cylinders standing dry; and all those in use have, I believe, been repaired, except perhaps a few in peculiarly favored positions. Other wells again yield water sufficient only for one or two *laos*, which were known before to supply double and treble the quantity of water. Besides which, this is a fact upon which the universal voice of the people is not, I think, likely to err. It concerns not one class only, but the whole community; among which it appears to be well and authentically received. It is, for instance, well known at Agra, that in the villages a few miles west of the city the spring used to be found at 27 cubits, and has now sunk to 35; and the fact being confirmed by the condition of the wells around, must I think be admitted.

6th.—Although I have obtained abundant proof that the spring, or "*sehja*," is very materially affected by even one year's drought, yet I am not disposed to refer the general recedence of the water-level to the brief period to which it is usually assigned. I incline to think that the recedence has been gradually increasing for many years. To what cause it is to be attributed I cannot pretend to determine; but the enquiry is one which, collated with observations in other neighbouring districts, might well engage the attention of the geologist. It occurs to me, however, that the great extension of ravines along the

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course of the Jumna, and the other minor streams, which form the drainage of this part of the country during a period of about two hundred years, may perhaps in some degree account for the change. And this idea derived some confirmation from the fact of all the pucka wells in the royal garden of Secundra, lying near the Jumna, and where the ravines have evidently increased, having, without exception, gone dry. It is evident that here no expense was spared in their construction, and yet a number of these, of great size and cost, have been for many years entirely dry, and none yielded a supply sufficient for irrigation, until repaired by the addition of new cylinders sunk to a greater depth.

7th.—Many of the kutcha wells in the district, and most of the pucka ones in pergunnah Khyragurh, of the construction termed "*khundoon,*" (viz., rough stones built without mortar cement,) do not reach to the spring or "*sekja,*" but are supplied by percolation, termed "*jhurrao,*" the water of which is much less certain in supply. A single deficient rainy season at once materially affects such wells, which either go dry, or retain only a diminished supply of water. The percolation level is less than that of the spring, and the supply from it used to be obtained at an average depth of thirty-three feet, and now of forty-eight feet, showing it to have receded fifteen feet. This recedence in Khyragurh may perhaps be sufficiently accounted for by the decay of the bunds and dams by which, at a time antecedent to the British rule, the stream of the Khiwar nuddee, which runsthrough the pergunnah, used to be intercepted, and made to inundate considerable tracts of land. In the other pergunnahs kutcha wells are generally, and pucka cylinders are always, sunk down to the spring. Omitting Bah Pinnahut, where it is exceptionally deep, the average spring depth formerly prevailing seems to have been about forty-seven feet, and is now fifty-eight feet, showing a recedence of eleven feet.

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8*th*.—In respect to the repair of old pucka wells, I would observe that it may be effected by any of three methods, viz.:—

Firstly.—By sinking the original "*gola*," or cylinder, down to the present spring.

Secondly.—By sinking a new masonry cylinder of smaller diameter, (termed "*putkooeea*,") from the termination of the old and larger one to the new spring.

Thirdly.—By fixing a wooden "*kota*," or cylinder, termed also "*gurhwaee*," in the centre of the well, below the old cylinder of masonry.

9*th*.—The first process is much the most useful one in its result, if successfully accomplished; for the original diameter of the well is not diminished, as is the case in the other methods, and the supply of water obtained is therefore greater; but it is often rendered impossible, by the injured state of the old cylinder. When followed, the process is to remove the well-head, or "*munghutta*," and loosen the earth about the "*gola*," after which the usual mode of "*siahee*," or sinking, is pursued. I am glad to find that two cylinders were successfully sunk last year, in this manner, in the bhyachara village of Gotta, near Agra. The *second* method, by the sinking of the small inner cylinder, or "*putkooeea*," is that more generally followed. The foot of the old *gola* is first secured, to prevent its falling in, and the *putkooeea* is then sunk. It is an objection to this process that the diameter of the well is so much reduced, as to diminish generally by one-half the supply of water, which a cylinder of the original dimensions would have yielded.

The *third* process is recommended by its cheapness, but it is also the least effectual; and though it sometimes suffices to supply two *laos*, or "*pyras*," with water, yet from the very small diameter of the wooden cylinders, and the difficulty of sinking them deep, such result is rarely obtained.

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10*th*.—It may be interesting to refer to the particulars of the repair of a fine pucka well in the Secundra garden by the second, or "*putkooeea*" process, begun by Mr. C. C. Jackson, and completed by myself, at a total cost of Rs. 588-9-9, which are detailed in the memorandum and section which follow. Sand impeded the completion of the well, and it was necessary to use the "*jham*," to sink the "*putkooeea*" down to an unusual depth.

A. B. }
A. B. } Old Cylinder.

Width, ... 12 feet.

Depth, ... 72 feet.

Condition when repair was commenced, ... } Dry and unserviceable.

C. D. }
C. D. } New Inner Cylinder, or Putkooeea, sunk by Mr. C. C. Jackson, in 1849.

Width, ... 6 feet.

Depth, ... 21 feet.

Amount of water obtained in the well by the first repair, ... } Not sufficient for one lao.

Cost of first repair, ... Rs. 404-15-3

D. E. }
D. E. } Additional length of new Inner Cylinder, or Putkooeea sunk by Mr. Gubbins, in 1851.

Width (as before,) ... 6 feet.

Depth, ... 14 feet.

Total amount of water obtained in the well by the second repair, } Full supply for two laos.

Cost of second repair, ... Rs. 183-10-6

Abstract of result of the entire repair.

New Inner Cylinder.

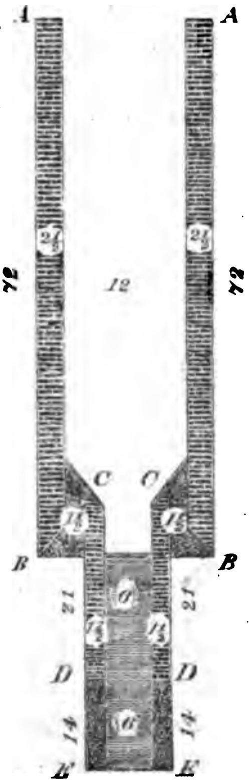
Width, ... 6 feet.

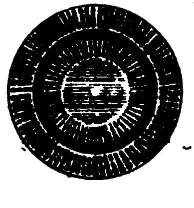
Total Depth, ... 35 feet.

Depth of water in the well, ... } 30 feet.

Number of laos now supplied by the well, ... } ... 2

TOTAL COST OF REPAIR.,	... 588-9-9





11*th.*—I have made much enquiry, in order to ascertain the causes which have operated to prevent the restoration of so great a number of pucka wells. These may I think be summed up as follows :—

Firstly.—Original imperfect construction rendering repair impossible; such is particularly that prevailing in Khyragurh and Futtehpore Secree; termed "*khundooa,*" or the rough stone well, and also that termed "*eetooa,*" by which the well is built from the bottom of brick and mud cement.

Secondly.—The want of means on the part of the agriculturists, and the uncertainty of eventual success.

Thirdly.—In zemindaree villages, the absence of the stimulus which would be derived to the zemindar by the prospect of an immediate enhancement of rent.

Fourthly.—In bhyachara villages, the obstacle presented by the want of union among several sharers owning one well.

12*th.*—To explain the operation of the last three causes, the following remarks are necessary:—It is not always possible to predicate success in undertaking the repair of an old cylinder, and though the owner may obtain an advance of tuccavee, to assist his own want of means, yet the failure of the attempt might involve himself and his sureties in ruin; and he is often withheld by this consideration. Again, in zemindaree estates, in ordinary seasons, there is seldom any, never much, difference between the rent paid by a ryot for a field irrigated by a pucka or a kutcha well; so that the zemindar derives little immediate profit, upon the outlay necessary to repair a pucka one. True, he would benefit by the increased area irrigated, but the improvement of rent is small, and is not sufficiently tempting. The *assamee* is often a hereditary cultivator, holding on a quit-rent, the re-adjustment of which might cause differences, and the thing is left alone. The *malgoozar*, too, frequently forgets that a year of famine or drought may come, and with the absence of forethought,

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which so characterizes the native, makes no provision for it. The cultivator would always be glad to effect the repair of a pucka well, but he rarely, if ever, has the means of doing so.

13*th*.—It would be very unjust to draw an unfavorable comparison of the pressure of Government revenue in the present time, as compared with the bygone period when these wells were constructed, from the want of means which has been stated as an obstacle to their restoration. Want of means now is found in the co-parcener of a bhyachara village, and in the non-proprietary tenant. It may fairly be doubted if these classes constructed any of the pucka wells, the decay of which we are investigating. In the time to which these works belong another state of things prevailed. Villages, especially in the pergunnahs around Agra, were extensively held in jagheer, in maufee, and in istumrar, by persons of station and property, and there is no doubt but that most of these works must be referred to them. Or, the chief of a village acquired means, and sunk a well, which is now the property of a number of his descendants, whose divided means, and want of union, not unfrequently prevent repair. I do not say that the difficulty experienced by these latter is not sometimes aggravated by an over-pressure of the revenue. Such is undoubtedly sometimes the case, but it is far from being always the case. Nor do I believe that the classes, whose want of means is now admitted, were better off in the days of Akbar. But then there existed another class, which now *is not* interested in, nor possessed of, means of improving the land.

14*th*. *Fifthly*.—The circumstance that kutcha wells can be easily and cheaply constructed in most villages, operates no doubt to make the loss of the pucka ones less felt, and relieves the agriculturist from the immediate necessity of repairing them. This is a subject of great importance, and has accordingly engaged my particular attention. For if the kutcha well be really a sufficient substitute for the

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pucka one, we need not waste much regret on the loss of the latter, nor incur much expense in restoring them. The most important particulars respecting kutcha wells, which have been elicited by my enquiry, will be found in the appended statement, to which I beg to refer :—

Number.	Pergunnah.	Per-centage of Spring Wells.	Per-centage of Jhurrao Wells.	Average Irrigation in Pucka Beegahs. From Spring Wells. In a good season.		Average Irrigation in Pucka Beegahs. From Jhurrao Wells. In a good season.		Average depth in cubits. Spring.		Average cost of making a Spring or Jhurrao Well.	Average length of time the Well will last.
				In a good season.	In a season of drought.	In a good season.	In a season of drought.	Spring.	Jhurrao.		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
										Rs.	Yrs.
1	Furrah ...	73	27	6	4	4¾	3	36	34	7	5
2	Futtehabad, ...	91	9	6	4	5½	3½	48	33	6	7
3	Futtehpore Secree,...	83	17	7	5½	6	4½	33	18	5	1½
4	Huzzoor Tehseel, ...	72	28	6	4	5	3½	41	35	10	3
5	Iradutnuggur, ...	89	11	6	4½	5½	4	41	36	4½	1
6	Khundowlee, ...	85	15	6	4	5	3½	42	40	22	16
7	Khyragurh, ...	24	76	6	4	4¾	3	38	30	7	4
	Total, ...	517	183	43	30	36½	25	279	226	61½	37½
	Average, ...	74	26	6	4¼	5¼	3½	39	32	8¾	5¼

Remarks.—There are two descriptions of kutcha wells, the *first* in which the sides are protected by a light "*bunda*," or wicker-work made of cotton or urhur stalks or twigs of trees. The cost of such wells varies from Rs. 5 to 10, and they last from 1 to 6 or 7 years. The *second* description is made by sinking a *gurhwaee*, or wooden cylinder, from the point where the water is first found down to the spring. Wells so made are much more expensive, costing from Rs. 20 to 25; but they are also much more durable, lasting for 16 years and upwards.

15*th*.—There is no doubt that in ordinary years the kutcha well does in most villages form a tolerable substi-

tute and remedy for the loss of the pucka one. There are villages in which they can in no season be made, but these are rare. Kutcha wells can usually be sunk at a cost varying from five to ten rupees, and last from two to seven years, with slight yearly repair. They yield water in average seasons, sufficient to irrigate from five to six pucka beegahs; and when a pucka well falls into decay, the loss is supplied by sinking one or more kutcha ones.

16th.—But it is otherwise in seasons of drought and famine. Then it is that the advantage of the pucka well is conspicuous. The spring and percolation water-levels at once sink in kutcha wells; and the supply of water so greatly diminishes, that four pucka beegahs is a high average to take of the amount of land which can then be irrigated from a kutcha well. But it is then also that the cultivator's means are most crippled, and his capability of incurring expense is least. In ordinary years, the good khurreef harvest supplies him with food and fodder; and the village *bohra*, or banker, is ready, to make him the necessary advance, to repair his well and find seed, upon the strength of the anticipated rubbee produce. In a year of drought all is changed. The wants of the *assamee* are all increased; food for himself and family deficient; increased charge for his well repairs; higher cost of seed and fodder for the well cattle; and to meet all this there is a greatly diminished produce, the area irrigable from the kutcha well being diminished by one-third. No wonder, then, that the *bohra* (as expressively said by the people) withdraws his hand, and the wretched cultivator is forced to abandon agriculture and his home, and to betake himself elsewhere, to seek for a precarious livelihood. I do not mean to say that this is always the case. In bhyachara villages the small proprietary cultivator generally possesses some little means, and such is the case with some *assamees* in zemindaree estates. On

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the other hand the kutcha wells in some quarters are exceptionally good; and where more expensively and better constructed, by the addition of a wooden *kota* or "*gurh-waee,*" they yield a proportionately larger supply. Still the case is as I have stated it more generally, and is not exaggerated.

17*th.*—Now note in such years the superiority of the pucka well. In ordinary seasons, the *lao* of a pucka well may be assumed to be capable of irrigating two pucka beegahs more than that of a kutcha one; that is, reckoning the irrigation from the latter at six pucka beegahs, the area irrigable from the first will be eight pucka beegahs. But most pucka wells admit of two or more *laos*, and yield therefore a total irrigation of sixteen pucka beegahs. Their supply of water is not generally much affected by drought. But supposing it to be reduced to fourteen pucka beegahs, we have still the comparison as follows, viz., that in a year of drought, the area irrigable from a pucka well is to that of a kutcha well as fourteen to four, to which must be added the important consideration that there is no new charge for construction or repair. While, then, the return is more than treble, the cultivator's expense is less. It is not surprising, then, that the *bohra* should be willing to continue his advance to such an *assamee;* and it is a common observation among the people, that the cultivator who holds a pucka well never abandons his village.

18*th.*—It is difficult to exaggerate the injury resulting to a village from the abandonment of the *assamees* in years of drought. Attached to the soil by no hereditary love of property, they depart, and often never return;—and it generally takes many years of plenty to repeople a village, which has suffered much from desertion. With these notorious facts before them, it might be supposed that zemindar proprietors would bestow more attention to

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the importance of providing against such loss, which could be done by a timely restoration of their pucka wells. And such is sometimes the case, but rarely, for generally improvidence prevails, and because no considerable improvement of rent is at once attainable, the important work is neglected, until drought or famine bring ruin to the village, and loss upon themselves.

19*th.* *Sixthly.*—Want of sufficient attention on the part of the local Revenue authorities to the prosecution of these important works of repair, so particularly recommended in paragraphs 44 and 45 of the "Directions" must, I fear, also be admitted. I plead guilty to the charge myself. The fact is, I believe, that a District Officer's time is generally too much occupied with the discharge of present urgent duties, to allow of sufficient leisure to develop the causes, and mature a remedy for those evils, which are not so immediately pressing. It might be thought that, once the Government demand had been limited for a term of thirty years, the originating of repairs and improvements of this nature might be safely left to the self-interest of the landholders themselves. Such expectation however would often be disappointed, and the impulse and aid of the officers of Government is really often needed. Take, for instance, the case of the large estate owned in this district by the heirs of the late Rajah Putnee Mull, of Benares. It is managed by an agent at Agra, and, I believe, rarely yields a fair profit. The management is no doubt not good, but yet it is not for the sake of any profit that the owners retain it. They do so for their name's-sake, and would not allow a village to be sold on account of the disgrace attending it. With such zemindars, any small improvement of rent would form no sufficient incentive to the expenditure of a large sum on the repair of wells; but I have no doubt that if the Collector caused a return to be prepared, showing the number of pucka wells capable of repair, and the probable cost

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attending it, and sent it to the zemindar, pointing out the benefit that would surely result in a year of drought, that any reasonable sum might be obtained to effect the desired improvement.

20*th*.—The influence of the District Officer would similarly avail in effecting a settlement of the terms upon which the well occupied by a quit-rent *assamee* should be repaired by the zemindar, and in reconciling the differences which prevent the union of several sharers in a bhyachara village for the same desirable object.

21*st*. *Seventhly*.—But the present practice, respecting tuccavee advances, opposes a great obstacle to the affecting the desired improvement, even where the attention of the local authorities has been drawn to the case. It has been usual in this district to demand collateral security, and though it has been shown in paragraph 47 of the "Directions," that this may often be dispensed with, yet the applicants are frequently co-parceners, or small sharers, in a large community, in which it would be difficult to induce the whole body to undertake the responsibility of re-payment. Again, the property benefitting is often small, and should the undertaking prove unsuccessful, might be insufficient for the recovery of the advance. Another objectionable feature in the present practice is, that the instalments of re-payment are made to begin too soon, sometimes from the season next following the advance. They should, I think, be altogether deferred until the work has been completed; also the instalments of re-payment must sometimes, where the owners are poor, be allowed to extend over a longer period than is now usual.

22*nd*.—I think, also, that the rule of the Board, contained in paragraph 249 of Appendix No. V. to the "Directions," requires alteration, and that instead of being in a hurry to pay over the whole advance to the zemindar, it should be paid cautiously and gradually, and only as the work proceeds. If so made, there need be little fear of any

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tuccavee balances, except such as arise by reason of failure of the work for which the advance was made; and where such is the case, it should be remitted. In all other cases, balance now arises from misapplication of the money, which is diverted to purposes foreign from that for which it was bestowed. This could not be the case under the system of issue now recommended.

23rd.—There is, I think, no resisting the conclusion that this return has developed the existence of an evil of great and increasing magnitude, for the recent examination has shown that the number of unserviceable wells has increased since 1850; also that the evil is one which, in a district like Agra, shown by experience to be particularly liable to drought, especially calls for attention and remedy. With this view I beg to submit the following suggestions, and if these meet the approval of superior authority, I propose to commence immediately remedial measures in this district in accordance with them.

Number of Pucka Wells that have become unserviceable since the revised Settlement.		*Extent of area calculated to be irrigated from this number of Laos.*
Wells.	Laos.	Pucka Beegahs.
2,612	5,894	35,454.

24th. *Firstly.*—That a complete register of all pucka irrigation wells be made for every mouzah, adopting a form which shall supply every necessary particular of information, especially regarding the present condition of each well.

Secondly.—That one or more experienced well-sinkers be entertained in each pergunnah, to examine and report upon the injured wells, and prepare estimates of the cost of repairing such as admit of restoration. The wages of these men may, where necessary, be borne by the State, but I have no doubt but that, ordinarily, they would be

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gladly discharged by the people, or might form part of the tuccavee advance.

25*th*.—*Thirdly*. That where the zemindar is obviously possessed of property, and non-resident, a list of injured wells, and estimate of the cost of repairing them, shall be sent to him by the Collector, recommending their restoration; and that should he furnish the means, and solicit the aid of the local Revenue authorities, such assistance, devoid of all responsibility, should be allowed.

Fourthly.—That where restoration of the wells may be effected by the intervention of the Collector, either to adjust the rents between the zemindar and his tenant, or to promote union between a number of small proprietors, he be encouraged to make use of it.

26*th*. *Fifthly*.—That the ordinary practice of tuccavee advances be modified in the following particulars:—

1*stly*.—Where the measure adopted for the repair of a well fails, the Collector should be permitted to recommend the remission of the advance. I would not make any stipulation to this effect, but leave the owner open to every incentive to exertion, which the hope of gain and fear of loss can supply; but practically where he had done his best, and failed, I would remit the advance. Similarly, where unforeseen circumstances greatly increased the expense of the work beyond the estimated cost, I would remit the surplus.

2*ndly*.—The property benefitting from the well should be accepted as sufficient security for the tuccavee advance, not only to the extent recognized in paragraph 47 of the "Directions," but also in the case of smaller properties. I think that they will be generally found to be sufficient for this purpose where the work has been completed, and the proposed system guards against misappropriation of the advance, without the completion of the work; and provides for its remission in case of failure. On an average the cost of repair will not exceed Rs. 200.

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3rdly.—The advance, when sanctioned, should be issued gradually to the owner, and in proportion to the progress of the work. This will not be found difficult.

The village putwaree will be charged with the account of disbursement, and before a further advance is made, the work will be inspected, and progress ascertained by a tehseel official, accompanied by the pergunnah well-architect. I attach much importance to this provision, which strikes at the root of tuccavee balance, and those greater irregularities noticed in paragraph 45 of the "Directions."

4thly.—The instalment of re-payment of tuccavee should be limited to the means of the owner, and may be extended, where sufficient reason can be shown, even to eight years. Such would be an extreme case, however, particularly as I would provide for the re-payment being altogether deferred until the work is completed. Until then it is clear that the zemindar *needs aid*, and is in no position to re-pay. Yet it now does occur that the advance is wholly recovered before the work has been completed. This is certainly a mistake.

5thly.—If the third suggestion be approved, it will follow that some alteration will be necessary of the Board's rule, paragraph 249, referred to in paragraph 21 of this letter.

27th. Sixthly.—In order to bring, under periodical review, the condition of these important works, I would suggest that the return of pucka irrigation wells, provided for by paragraph 24, should be added to the yearly statements required from the putwaree, and an abstract memorandum of the same, showing the progress of decay and repair, accompany the yearly Revenue Administration Report. Thus the attention of the Collector would be periodically drawn to this highly important matter.

28th.—I shall be glad if the suggestions which I have offered are deemed useful. If authorized to introduce them into this district, they shall be tried to the best of my ability, and I confidently anticipate from them much

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success. The whole subject of the sinking and repair of wells, however, is I feel still imperfectly understood by me, and is capable of much development, both by the collection of a variety of facts, and by the application of the professional knowledge of Engineers, who have given their attention to it; and I shall rejoice if the result of these observations be to elicit such a record of facts and professional information, as shall assist all Revenue Officers in charge of districts beyond the influence of our great Canals in the construction and repair of these important works of irrigation."

These reports were laid before Government on 21st February, 1854, and in reply the Board were directed to require the Hon'ble R. A. Drummond, who had succeeded Mr. M. R. Gubbins as Officiating Collector of Agra, as soon as he should have acquired sufficient local experience, to report further on the subject, with special reference to the remedial measures proposed by his predecessor. The Board were further requested to compile a Note on the subject, for publication in the "Selections from the Public Correspondence of the North-Western Provinces." It was considered that such a Note might attract useful attention to the subject, and promote the enquiries of competent parties. These orders were conveyed in Mr. Secretary Muir's letter, No. 1357, under date 21st March, 1854.

G. J. CHRISTIAN,

Secy. Sudder Board of Revenue, N. W. P.

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THE following are copies of the letter of the Board, and of the orders of the Government in reply, referred to in the foregoing paragraph :—

From C. P. CARMICHAEL, ESQ., *Officiating Secretary to the Sudder Board of Revenue, N. W. Provinces, to* W. MUIR, ESQ., *Secretary to the Government of the N. W. Provinces, No.* 108.—*Dated Agra, the* 21*st February,* 1854.

REVENUE.
Present :
D. B. MORRISON, ESQ.,
Senior Member.

SIR,—With reference to the order of Government, No. 23 of 1854, dated the 3rd January, and to previous correspondence therewith connected, I am directed by the Sudder Board of Revenue to request that the accompanying correspondence, supplying the information called for by the Hon'ble the Court of Directors, regarding the decrease in the Agra division of the number of wells used for irrigation, may be submitted for the perusal and orders of the Hon'ble the Lieutenant-Governor.

2*nd.*—To whatever cause the fact is to be attributed. whether to a general rise, bodily, of the land over an extensive tract, to a diminution of the annual quantity of rain arising from a decrease of trees or other influence, or to the actual lessening and subsidence of the body of water percolating at a depth through the soil, it is now generally admitted that, extensively in the Agra, and partially also in other divisions, great numbers of substantial wells have become dry, and new ones have to be dug deeper than before; nuddees which used to run constantly, have a stream only in the rains, and the surface of the soil has less moisture than at former periods. The present correspondence furnishes evidence on these several points.

3*rd.*—The returns of the Agra district, originally submitted, were, it seems, inaccurate. They have now been revised, with the result of showing that the decrease of wells in 1848-49 should have been stated at 2,050, instead of 1,924. The statements of the other districts have on fresh examination been in all respects verified.

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4th.—The following abstract exhibits the general results for the division, except Furruckabad, in which there was an increase, as originally reported:—

Abstract of Pucka Wells.

Zillahs.	Number of Wells.		
	In the year of Settlement.	*End of 1848-49.*	*Decrease.*
Muthra, ...	6,601	5,609	992
Agra, ...	7,978	5,928	2,050
Mynpoorie,...	11,186	9,170	2,016
Etawah, ...	1,504	1,212	292
Total, ...	27,269	21,919	5,350

5th.—The decrease in these four zillahs was therefore 5,350 wells, instead of 5,224, before reported.

6th.—The report of the Collector of Agra is very elaborate, and contains much matter worthy of consideration, especially the suggestions offered to secure the restoration of masonry wells which have become unserviceable: these however will require the opinion and experience of practised engineers, before they can be generally acted upon; and the Board would suggest that this be done under His Honor's instructions.

7th.—The Board are not prepared to agree with Mr. Gubbins in his strictures upon the operation of the system of tuccavee advances, at present prevalent in these Provinces. They are not aware of any disadvantages attending the rules for such advances; nor have any been brought to their notice from other quarters. Indeed, so much is left to the discretion of the local officers, both as regards the amount of the advance required for each work, and the mode of its re-payment, that it is entirely the fault of these officers, if the first be inadequate, and the last press too heavily upon the recipient. The precautions directed

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to be observed are merely such as are necessary to ensure the honest application of the money advanced for the purpose solicited, and its gradual re-payment, which, without such returns, was apt to escape notice, as experience amply showed.

Government Order, No. 4763, dated 6th December, 1847, paragraphs 3 to 6.
Government Order, No. 4637, dated 30th November, 1852, paragraphs 3 to 5.
Government Order, No. 170, dated—January, 1853, paragraph 2.

8*th*.—The Board are not aware of a single instance in which the recovery of a tuccavee advance has been enforced, where grounds have been shown to warrant its remission; and the very liberal orders of Government, quoted in the margin, under which large sums of tuccavee of old standing have been struck off the public accounts, is a proof that no wish exists either on the part of the Board or Government, to bear harshly or heavily upon zemindars, or village communities, exhibiting proofs of their desire to improve their lands by applying for advances in aid of such a laudable design.

I have, &c.,

C. P. CARMICHAEL,

Offg. Secretary.

From W. MUIR, ESQ., *Secretary to the Government of the North-Western Provinces, to* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue, N. W. Provinces, No.* 1357. *—Dated Head-Quarters, the* 21*st March*, 1854.

REVENUE DEPARTMENT.

SIR,—I am directed to acknowledge the receipt of your letter, dated 21st ultimo, No. 108, submitting a correspondence regarding the decrease of the number of wells in the Agra division, and supposed subsidence in the level of the sources from which they are supplied

2. The Lieutenant-Governor directs me to state in reply, that before giving further directions on the subject, he would wish the energetic and efficient Officer, the

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Hon'ble R. A. Drummond, who has been appointed to relieve Mr. Gubbins in the charge of the district of Agra, closely to consider the suggestions which have been offered in the careful and useful report submitted by the latter gentleman, and to report his opinions and recommendations thereon, after he shall have acquired adequate local experience.

3. His Honor will be readily prepared to sanction any measures, which, after full examination and testing of the views formed by his predecessor, Mr. Drummond, may show good ground for believing to hold out the prospect of adequate advantage, through aid, in tuccavee or otherwise, towards the repair, or fresh construction of pucka wells. The reasons which may keep back the zemindars from applying for a liberal advance of tuccavee for the provision of such permanent means of irrigation, in a part of the country where rain is ordinarily so uncertain and deficient, should be thoroughly investigated.

4. The Board are requested to cause a note to be drawn up, embodying the results of the opinion now offered as to the diminution in the number of pucka wells in the Agra division, in a form fit for publication in a number of the "Selections." Such a note may be expected to attract useful attention to the subject, and to promote the enquiries of competent parties. The information before the Government is not yet so complete and accurate as to admit of a specific reference for the advice of scientific officers.

5. This correspondence will be brought specially to the notice of the Honorable the Court of Directors, by whose orders the statements now received from the local officers were called for.

6. The enclosures of your letter are returned, copies having been kept for record.

I have, &c.,

W. MUIR,

Secretary to Government, N. W. P.

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The following correspondence was held upon this subject after the preparation of the above memorandum:—

No. I.—*From the* Hon'ble R. Drummond, *Officiating Collector of Agra, to* H. Unwin, Esq., *Commissioner of Revenue, Agra, No.* 321.—*Dated Agra, the* 12*th September*, 1854.

Sir,—With reference to your letter of the 15th April last, No. 135, with enclosures, I have the honor to submit my opinion on the subject of well irrigation, and the best means of repairing the deficiency in irrigation generally. I regret that the press of ordinary work, and the hot season, have prevented my making a tour through the district, and thus making myself acquainted with its requirements; but it has been unavoidable, and I can only give the result of enquiries made through others.

2*nd*.—As far as I can judge, I should say there was little doubt that the recession of water-line has been caused by the deficiency of rains for several successive years. This drying up of jheels, swamps, &c., is not confined to the country west of the Ganges. It is the same in Rohilkund and in Oude, even where the forests have not been affected by increase of cultivation. Every one I have met in those parts of the country bore testimony to this fact.

3*rd*.—It therefore only remains to propose some practical remedy, for nothing remains to complete the enquiry in this district; my predecessor, Mr. Gubbins, in his interesting report having, I believe, accurately described the present state of things.

4*th*.—The pergunnah of Futtehpore shows that, by making use of the periodical floods, and damming up a considerable extent of country, the water-line is generally affected all round.

5*th*.—Before, therefore, advocating a general introduction of well construction, which will probably involve a very large outlay, I think it would be as well to find out what means we may have in the district for irrigation, by damming back the floods, and saturating large surfaces for

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the spring crop. Although this involves the loss of the land for one season,—*i. e.*, the autumn crop,—yet if it assists in raising the general water line, and gives a fair crop in the spring, it will probably be most advantageous to introduce this system. It remains to be seen what effect it may have in a sanitary point of view.

6th.—It must also be considered that, although works of this nature may have formerly existed, they have fallen so long into disuse, that some compensation would have to be made for the total loss of the autumn crop on those lands which are flooded. This would however be partly covered by the increased value of the spring crop. I believe that lands in mouzah Seekree, which formerly paid two and three rupees per beegah, are now rented at nine and ten rupees, and the crops, which I myself saw on the ground in the latter end of March, certainly showed that even such rents were not too high.

7th.—The localities adapted to the flood dams are not accurately known. On the east of pergunnah Furrah, a large jheel exists in the Bhurtpore territory, which might, I understand, be made available for irrigation. In Khyragurh several such localities are reported, and a careful survey will no doubt bring others to light.

8th.—The attention of the late Lieutenant-Governor was drawn to the subject of irrigation from the Jumna, and there are now some levels in the office taken by Colonel Cautley, taken from a point about ten miles above Agra, but the height was too great to raise the water for any practical purpose. Mr. Parsick mentioned to me that he had visited a place above that selected by Colonel Cautley, where he, Mr. P., thought the plan more feasible. I went out in May, and visited the spot with Mr. Parsick, and levels were taken on a line nearly due north and south, which came out about eighteen miles below, near Achneyrah, on the Bhurtpore road, at a point 27 feet above the hot-weather river water-line. I had no means of carrying on the levels; but as the fall in the last two-and-a-half

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miles was 15 feet, it is probable that, if continued, the zero of level would soon have come to the surface.

9*th*.—I do not think, however, that any irrigation could be profitably derived from the Jumna, as the Agra district, forming a kind of peninsula between the Jumna and Chumbul, a canal must end in the district. All plans must therefore be confined to *first*, wells, and *second*, dams, to hold up the floods of the natural rains, and from the smaller rivers.

10*th*.—For the *first*, I should recommend a register being commenced for record of all applications, on payment of certain fees, and a separate establishment being formed, I am not at present prepared to submit any well-digested plan for operations; but I might perhaps venture to mention the system now in use in Scotland and Ireland, for advances to landholders for *bonâ fide* improvements, as one capable of adaptation to this country.

11*th*.—For the *second*, nothing can be done until a sufficient establishment is entertained, to make the necessary surveys. In fact, without a contour survey of the particular districts, where irrigation resembling that now in Futtehpore is introduced, no proper system can be carried out. The amount of compensation will always be a subject of dispute, and the amount of land flooded, for which water-rent should be paid, will also be undecided. With two native surveyors on 50 Rupees per month, and 12 khulashees on 4 Rupees, or a total of 150 Rupees per month; or four surveyors with establishment for four months, at a cost of 600 Rupees, not including instruments, a great deal might be done towards developing the capabilities of this district. But I also think that, until proper surveys are made, any scheme for a large outlay in wells would be premature.

I have, &c.,

R. DRUMMOND,

Offg. Collector.

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No. II.—*From* H. UNWIN, ESQ., *Commissioner, Agra Division, to the* SUDDER BOARD OF REVENUE, *North-Western Provinces, No. 455.—Dated Agra, 18th September, 1854.*

GENTLEMEN,—I have the honor to forward* Mr. Drummond's Report on the subject of deficiency of means of irrigation, with his opinion and recommendation as to the modes of repairing that deficiency.

* *Vide* Board's docket, No. 98, dated 31st March, 1854.

2nd.—Mr. Drummond attributes the state of things described by Mr. Gubbins to deficient rains during a succession of years; and I believe that we need not look further for the cause, which would seem quite sufficient to produce the effects. There have been but two or three good seasons since the year of drought 1837, and it is natural that such constant failures of rain should affect the water-line.

3rd.—Before proposing any scheme involving any large outlay on pucka wells, Mr. Drummond thinks the facilities for irrigation by means of dams should be ascertained, and that surveys should be made with this object, which would involve a cost of about Rs. 600.

4th.—Loss of autumn crops, and risk to health, would be the consequences of flooding tracts of soil in this way, but the former would be compensated by superior spring crops, and the latter objection applies to nearly all modes of irrigation more or less. In pergunnah Khyragurh, the restoration of many such works, disused for centuries, has been recommended in a separate report.

5th.—For a plan of well irrigation, Mr. Drummond would recommend the commencement of a register of applications from landholders, and a separate establishment, analogous to the system in use in Scotland and Ireland, for advances for *bonâ fide* improvements.

6th.—No allusion is made to the causes which deter zemindars from applying for tuccavee. I am inclined to believe that much depends on the pains taken by the Collector to assure them of his readiness to advance for

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proper objects, and to allow long terms and small instalments for re-payment; and a good many recent applications have been made in the Agra district.

I have, &c.,
H. UNWIN,
Commissioner.

No. III.—*From* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue, N. W. Provinces, Agra, to* W. MUIR, ESQ., *Secretary to the Government of the N. W. Provinces, No.* 760.—*Dated Agra, the 6th of October, 1854.*

REVENUE.
Present:
R. A. READE, ESQ.,
Member,
and
R. K. DICK, ESQ.,
Offg. Member.

SIR,—In continuation of my letter No. 672, dated 8th September, submitting a note compiled in this office, on the decrease of wells in certain districts of the Agra division, I am desired by the Sudder Board of Revenue to submit a further report from the Commissioner, enclosing one from the Officiating Collector.

2nd.—The Board consider that assistance towards constructing wells of sufficient depth is the safest remedy for the evil brought to light. In the Agra district, to reach the main springs, wells must be sunk through a deep stratum of sand, to reach the kunkur, short of which they are dependent on lateral springs, which are affected by the scarcity of the rains.

3rd.—Instances can be pointed out where, in adjacent estates, wells sunk to the kunkur have twenty-four feet of water against ten feet in wells dependent on lateral supply.

4th.—Works of irrigation by flood-dams require great engineering skill, generally a large outlay, and are objectionable for sanitary reasons.

5th.—Advances have already been made of late in the Agra district for new wells to a large extent, with an ample

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term for re-payment, and the Collector will encourage the people to seek further assistance.

I have, &c.,
G. J. CHRISTIAN,
Secretary.

No. IV.—*From* W. Muir, Esq., *Secretary to Government, N. W. Provinces, to Secretary Sudder Board of Revenue, N. W. Provinces, No. 2095 A.—Dated Head-quarters, Revenue Department, the 17th October, 1854.*

Sir,—I have the honor to acknowledge the receipt of your letter, dated the 6th instant, No. 760, with enclosures, relative to the decrease of wells in the Agra division, and in reply to inform you, that the Hon'ble the Lieutenant-Governor is glad to perceive that attention will now be carefully given to furnishing aid to the proprietors of land, in the sinking of wells of adequate depth.

2. Besides a ready encouragement and assistance for that purpose, the Government will be prepared to consider favorably projects of irrigation by flood-dams, where the circumstances of the locality are decidedly favorable to works of that class. It will be proper, on this point, to await the report of the scientific officer, whom it is intended to employ in examining the remains of the old works in pergunnah Khyragurh, and any further suggestions which may be made by the Collector, after he becomes personally acquainted with the interior of the district, during his cold-weather tour.

3. The original enclosures of your letter are herewith returned, copies having been kept for record.

I have, &c.,
W. MUIR,
Secretary.

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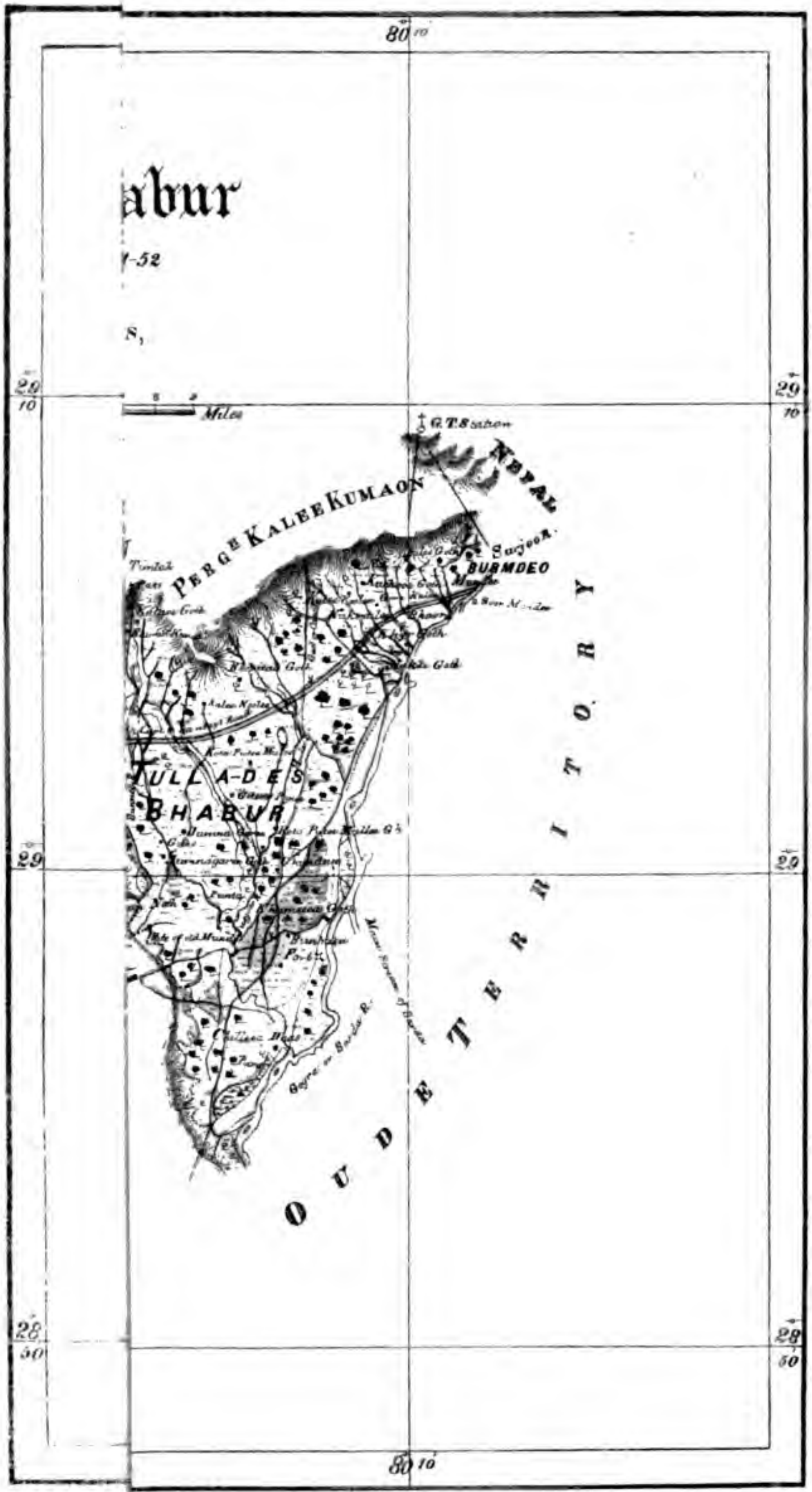

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No. 8.

TOPOGRAPHICAL NOTICE OF THE KUMAON BHABUR, AND PILLEEBHEET FOREST AND TURAI.

Topographical notice of the Bhabur and Turai tracts lying between Kumaon and Pilleebheet. By Lieutenant F. J. BURGESS, *74th Regiment Bengal N. I., Revenue Surveyor. Extracted from his Survey report, dated 24th November, 1853.*

51. *Forest between the Sardah and Sookee rivers.*—My survey operations during the past two seasons have extended from the Sardah river (the Gogra of the plains) to the Sookee, including puttee Bhabur Tulla Des, of pergunnah Kalee Kumaon and Deaneerao.

52. This tract, also commonly called pergunnah "Kundee," from its being under the spurs, or shoulders of the hills, is crossed by numerous rivers;—the Deoha taking its rise in the interior of the hills; the others being mostly small streams, or the dry beds of mountain torrents.

53. *Described by Mr. Batten, and Geological formation.*—The Kumaon "bhabur," or high forest, has been fully described by Mr. Batten in his published reports; and the theory of its geological formation set forth, of its resting on a bed of gravel and shingle, of unknown depth, filling an impervious basin of clay, the porous upper stratum absorbing all streams in their passage through it from the hills, which again make their appearance where the shingle bed thins out, and the clay basin reaches the surface in innumerable springs, in the tract known as the Turai.

54. *This part of forest rather an exception to rule.*—This particular portion of the forest, however, differs somewhat from the general character, in so far that many of the

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streams flow on the surface of the forest. This Mr. Batten has also noticed.

55. *No cultivation in Forest, and only inhabited by Puharee cattle-graziers during the cold weather.*—The want of water, except at the heads of the larger streams, prevents cultivation in the upper forest, and it is only inhabited during the cold weather by the hill men, who come down to graze their cattle. They arrive about November, and leave after the Hoolee; and the roads, leading from the hills, are covered with men, women and children, with their household goods on their backs, and cattle in innumerable droves.

56. *Habits and mode of living of Puharees during their visit to the bhabur.*—They spread the mselves over the forest, and congregate in temporary villages, about the cattle-sheds or "goths," soon erected with the materials on the spot. The cattle are tethered to a stout rail in front of the huts, which are of a description the most miserable imaginable, formed of posts, with grass screens between for walls; the roofs thatched with grass thrown loosely on, and kept in its place with logs of wood. The interior is less inviting than the outside, dirty beyond conception, and swarming with vermin,—rather a recommendation than otherwise to a Puharee, but such as any one else must be hard-pushed indeed to take shelter in.

57. No jungle is too heavy for them; and in the wildest spots in the forest, the sportsman will be often surprised to find the object quietly moving in the grass he had assured himself was a tiger, turn out a Puharee woman or child, wandering, unconscious of danger, in search of flags for making baskets.

58. *Extent of migration.*—They extend their migrations to the Turai pergunnahs, where they engage in the manufacture of oil, as servants of the Tharoos, whose caste prevents their doing this themselves. They have

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extensive money-dealings with the Tharoos, and are reputed great usurers ; the latter being seldom able to read or write, and perfectly unconscious of accounts, must be pretty well at their mercy in these transactions.

59. *Manufactures Kuttha, or Catechu.*—They also engage in the manufacture of "kuttha," or catechu, from the bark of the Khyr. The process is said to be a secret with the women, by whom only it is made. The men fell the trees, and cut the wood into chips for boiling. The people employed in it establish their furnaces or boilers on the banks of the rivers, and remain till the Khyr forest in the neighbourhood is exhausted.

60. *Other manufactures.*—There is a colony of Munihars, or glass-bangle manufacturers, established on the banks of the Sardah below Birmdeo, and with the exception of mats, baskets, wooden vessels for milk, turned in a rude lathe out of the solid trunk of the "gaitee," a reddish wood growing on the second range of hills, I am not aware of other manufactures.

61. The Puharees are alone employed in felling trees in the forest, at which they are very expert. Their cattle must yield a very large surplus supply of ghee, which probably finds a market at Pilleebheet.

62. *Description of rivers and country between the Sardah.*—The Sardah river has its source among the snows of the Himalayah, and rushes out of the hills through a narrow and picturesque gorge at Birmdeo, a fine clear body of blue water, till the snow melts about April, wheni ts volume is greatly increased, and it becomes a turbid roaring stream.

63. *Not navigable, owing to rapids, or used for timber floats.*—Owing to the number of rapids in the river for many miles down, it is not navigable for boats, except such as are used at the ferries ; and the timber merchants find it more profitable to cart their timber across

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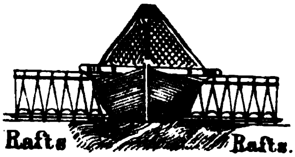
to Pilleebheet, and thence send it down the Deoha, than to float it down the Sardah. Sal timber is heavier than water, and would require a more buoyant body with it to float it. The Pilleebheet timber merchants attach the logs outside the boats, in addition to a cargo carried on board.



64. *Bamboos floated out of the Hills.*—Bamboos are floated down the rapids to the mart above Birmdeo-mundee, from within the hills where they are cut, and I have seen a man come down on two bundles loosely tacked together. But it appeared a most daring feat, requiring the greatest coolness and dexterity to guide and keep them in the narrow passages between the rocks at the chief fall, when they dip into a perfect sea, and for a moment are lost to view between the waves. Many of the bundles are seen stranded on the points of unapproachable rocks, sometimes swinging completely out of the water, to detach which, the perilous passage is made.

65. *Land-slip occurred, and dammed up the valley of the river.*—A tremendous land-slip took place a short distance above where the river comes out of the hills about five years since, and completely dammed up the river, the bed of which is said to have been quite dry for several hours; accounts vary from 3 to 12. Great damage was apprehended from its bursting through the obstruction; but fortunately it overcame it gradually, and no harm was done.

66. *Proposed Sardah canal.*—No use is made of its water, and Mr. Batten doubts if a canal would be of any service to the bhabur lands, owing to the depth of the channel below the surface; but the country slopes so rapidly from the hills, that there can be no difficulty in car-

rying it anywhere. The bed of the Sardah shows a succession of rapids all the way to Moondea ghât, some thirty miles down the river, and the canal might easily be carried along the high forest range, through Bilheree and Pilleebheet, into the Shahjehanpore district, and through the Oudh territory as far as Cawnpore. The benefit that would arise from it would equal, I imagine, that derived from the other great canals. A branch also might be carried across the Deoha to the Bareilly district, and a simple means of accomplishing this would be by large iron pipes, such as were used by one of the London Water Companies, laid down and sunk below the bed of the river. This would, I imagine, be far cheaper than an aqueduct over the river.

67. *Jugboora river; difficult country.*—Next to the Sardah in order comes the Jugboora, which runs out of the hills at the Timlah pass; the stream splits, and forms also the Sunnea, Goorka and Looea rivers, all of which vary in size, as they get a larger or smaller share of the supply; and the country between them is so cut up by other old river-beds, and *rows* or torrent ways, that it is a mass of ravines difficult to cross, and covered with thick tangled forest, and impracticable cane brakes.

68. *Deadly climate.*—There are a few small patches of cultivation immediately under the hills between Birmdeo and the Sunea, which forms the boundary between the pergunnahs Kalee Kumaon and Deaneerao, and one small patch at the end of a gool, carried some distance from the hills into the heart of the forest from Danda-ke-goth; but this is the most unhealthy part of the whole forest, and those who do cultivate, are obliged to return to the hills at night; so deadly is residence there considered.

69. *Chundnee and Bunbussa chandahs or clearings.*—About 5 or 6 miles below the hills commence an extensive line of chandahs or clearings, reaching from the

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Sardah to the Sunea, partially cultivated by Tharoos established at Chundnee, Bunbussa, Punta, Puntee and other villages. Bunbussa appears to have been an important place once, boasts a fort, and the remains of old mango topes. Some of the gools taken from the Goorkha, near Puntee, require attending to; they are forming swamps, the land between Bilheree and the forest being half under water in the cold-weather rains.

70. *Difficult nature of country between Looea and Kamun.*—Between the Looea and Kamun the country is cut up and crossed by innumerable nullahs, tributary to the latter, clear gravelly-bedded streams. Low sal-covered spurs from the hills extend some distance into the forest, and increase the difficulties of the country. The open grass plains or savannas begin to run up towards the hills, and are occupied by Tharoo cultivators of Kilpoora, Mujhola, &c., and from Birea of Bilheree.

71. *Kamun water not used for irrigation purposes.*—No canals are taken from the Kamun, and the natural difficulties of the country will prevent anything of the kind being attempted from the upper part. It might perhaps be managed lower down, where the high ground on either side seems favorable for it. The expense however would be very heavy, as floods come down with great violence, bringing trees and masses of rubbish with them. A canal, to be of extensive use, would have to cross the Tunara river.

72. *Impracticable country west of Kamun, Gungapore and Betallee plain.*—To the west of the Kamun the country is exceedingly difficult, a low range of hills running between it and the Ghun, covered with dense sal forest and tangled underwood, breaking into ravines and holes almost unpassable in any way, with a heavy swamp by way of variety in the old bed of the Kamun, opposite the deserted site of Murooa. Passing this, we open upon the flourishing clearing of Gungapore, a narrow strip of

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grass land, extending from it to the foot of the hills; then across the Ghun, Nehaee, Shenshee and Kylooea, with their smaller tributaries, the forest somewhat more open to the plain of Betallee, which also extends up to the hills under the market of Jowlah Sal.

73. *The forest gradually narrows.*—Only a small belt of forest, thinned by small clearings within it, intervenes between this and the Hunspore plain, where the forest altogether disappears for a space.

74. *The Deoha river, and country between.*—We next reach the Deoha. After passing a few nullahs, its tributaries, clear rippling brooks, always running, covered with the richest and thickest verdure, and their banks, with ferns in great variety,* offering a wonderful contrast to the waterless forest of Chukata to the west.

75. Occasional natural overfalls, formed by the deposit of lime (*Query?* Travertine) brought down in solution, make delightful and picturesque resting-places in the heart of the forest. The strongly-scented jasmine and graceful cane, the enormous water and other creepers, falling from the branches of the highest trees, add to the beauties of the scenery, but offer secure shelter to the tiger, or, occasionally, to the wild elephant.

76. *Irrigation from the Deoha.*—The Deoha, called the Nunda in the hills, and Garra in the plains, takes its rise some distance in the hills, and has a good body of water, of which but a very small portion is turned to account for irrigation purposes. Gools, or small canals, are taken off from the head for the small puharee clearings about Chorgullea, and one some distance down, where the banks are very low, (so low, indeed, that they are insufficient to confine its floods, which pass completely over the

* Ferns are met with in many of the streams, both in the Turai and forest; and the stinging nettle grows in great luxuriance at Kun ja Bagh on the Sardah, the only place I have met with it out of the hills.

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forest, and into the Kylas, Kukra, and Phowree) across the forest to Lalhur.

77. *Proposal to extend it.*—I have never seen the Deoha river dry, though a portion of the water is undoubtedly absorbed in the shingle, perhaps all during the hot months; so that I am quite of Mr. Drummond's opinion against that expressed by Mr. Batten, that the irrigation from this source may be greatly extended, even beyond the forest, and without reducing the Puharees' supply.

78. The quantity of water may probably be greatly increased by raising the bunds of the lakes in the hills, through which the Deoha is said to flow, as Captain Ramsay has done at Bheem Tal for the Gowlah Canal.

79. The Deoha water, like the streams east of it, contains a large quantity of lime in solution after rain, being of a milky whiteness from this cause. The springs from the hills immediately above where it debouches are very strongly impregnated, and deposit it in large quantities on leaves and other substances, over which it flows, or in stalactites. This is largely exported to Pilleebheet, Bareilly, Shahjehanpore, &c., where it is highly esteemed for its excellent quality.

80. Immense rafts of bamboos and small kurrees are floated down the Deoha from the forest; but the river can hardly be said to be navigable above Pilleebheet.

81. Beyond the Deoha, the country changes its character altogether. The forest again increases its depth, and is devoid of streams, partaking of the character of the dry Chukata, and other forests beyond.

82. The Sookee is dry to the edge of the forest, where it again begins to receive the water, parted with on its way through the shingle from the springs.

83. *Forests of no value for their timber.*—It is well known that these forests produce little or no timber of any value. An inferior description of sal (koroo) is cut and sawn into kurrees, chiefly in the lower forest, but I

am not aware of any large timbers being taken out. There is said to be plenty of such within the hills in the Dhoons, but the difficulty of getting them out must be insurmountable, until good cart-roads are made.

84. *Planks for Boat-building sawn in the forest about Chorgullea.*—A good deal of timber is cut on the sal "thaplahs" on the spurs west of Choorgullea, to which roads have been made; and planks sawn on the spot are exported in large quantities to Bankowlee, near Buheree, where they are used for boat-building, or sent down the Kicha to Bareilly, &c.

85. The timber for which the Pilleebheet market is so famous comes from the Oudh forests far across the Sardah.

86.—*Sisoo forests of the Sardah islands.* Many of the islands of the Sardah are covered with sisoo forests, but the trees appear to be all young; and probably owing to the sudden changes in the river's course, are liable to be swept entirely away before they attain any size. The same in the Deoha, &c., though on a smaller scale.

87. Colonel Alexander (of the Futtehgurh Gun-carriage Agency) examined the Kumaon forests during the past season, and his report must be most valuable and interesting. I believe his opinion is not so favorable as the hill authorities hoped it would be.

88. *Birmdeo Mundee.*—Birmdeo is the great trading mart of this part of Kumaon, between the hills and the plains, and there is also a large market called the Soor Mundee on the opposite, or Nepal side of the river. The produce of the north-eastern part of Kumaon and of Nepal, and of Chinese Tartary, finds its way down here to be exchanged for the goods and manufactory of Hindoostan or Europe.

89. *Hill products.*—The chief hill products are borax brought down from Thibet on sheep and goats, which sells on the spot for Rs. 18 per maund; woollen cloths, coarse hempen cloth made in the neighbourhood, wax, honey,

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chowrees, hill curiosities, overland tea in *cakes*, drugs in great variety, precious stones, ponies, hawks, mainahs, &c. Cholera had committed such ravages the previous season, and, breaking out again last year, created such a panic, that the mart was almost deserted. In busy times the scene must be an amusing one, from the congregation of traders of such different countries, climates and costumes.

90. *Bhooteah carriers and traders.*—The Bhooteahs travel with their families; the costume of the women is most singular; their hair in long plaits joined at the end with a long strip of cloth, covered with large rough pieces of blue stone like turquoise, and silver ornaments curiously wrought, with a huge "chatelaine," to which is hung innumerable articles, useful and ornamental.

91. Though some of these merchants are possessed of wealth, they are oftener employed as mere carriers, than as traders on their own account. Their flocks are guarded by enormous fierce, thick-coated dogs, not unlike the Alpine dog in appearance, which render it dangerous to approach their camps without notice. The shops at the Mundee are chiefly occupied by bunniahs and cloth merchants from Pilleebheet.

92. *Other markets at Jowlah Sal and Sunea Mundee removed to Bilheree.*—There is a market at Jowlah Sal, where is also a Police station, and a large Mundee at Bilheree. This was held, till lately, on the banks of the Sunnea, in the middle of the forest, and has been removed to its present situation on the Goorka river by Mr. Drummond. The change has caused a good deal of grumbling among the bunniahs, as might be expected; but when wells are made, and other requirements supplied, they will doubtless soon reconcile themselves to it. The situation is certainly preferable, and clear of the forest, with the open plain of Bilheree stretching to the south and west.

93. *New Gunge established at Kutymah-ka-Bagh.*—Mr. Drummond has also established a market at the old

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encamping ground, Kutymah-ka-Bagh, Albert Gunge, on the principle of the Victoria Gunge on the Bamouri road; and a road has been made, passing through Phoolayah and Nanukmutha, connecting them. These are crowded on market days, and must be of great service in increasing the trade of the district by the facilities they offer for the exchange of commodities.

94. Cloth and other merchants from Pilleebheet establish themselves during the healthy season, and these Mundees must eventually have some effect upon the habits of the Tharoos, by introducing luxuries they were before unacquainted with, and perhaps change their roving life.

95. *Mineral products of the lower hills; Iron and Coal.*—Of the mineral products of the lower hills I have little to say. Iron is brought down for sale, but not at prices sufficiently low to create a large demand. Veins of lignite make their appearance in the cutting of the new road round the Burokuree Pass above Bumouri, but they are not more than one or two inches thick, and not supposed to indicate the presence of coal of any value, or in any quantity. I was only aware of its existence from accidentally seeing it on my way down the hill, as I was leaving the district, and had no leisure to pursue any investigation there or elsewhere. I expect it will be necessary to bring down a large portion of the Burokuree hill before the road can be made permanent, as I recommended being done at first, when more light may be thrown on the subject.

96. *Gypsum.*—Gypsum is found in large quantities in many places in the lower range, particularly about Nynee Tal, the best being below the Nehal bridge, on the road up from Kala Doongee. Plaster-of-Paris, of good quality, has been prepared from it by Mr. Tregear, of the Bareilly College. It might be advantageously used for the repair of terraces and pucka roofs, as it possesses the property of expanding on cooling.

97. The line of Chorgullea has been already mentioned.

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98. *Forest roads.*—The roads and means of communication through the forest, except along the regular roads leading straight up to the hills, clear of the rivers, which are generally pretty good, are as bad as can be.

99. *Road from Birmdeo to Kala Doongee.*—Captain Ramsay has cut a road under the hills from Birmdeo to Huldwanee and Kala Doongee, to save the enormous circuit in travelling between these two points by Nanukmutha, &c. Much however must be done before it will be practicable for carts, though it is wonderful what a hackery will go over. But I really do not know how the survey could have proceeded without it, or without cutting a road for the purpose of connecting the upper part of the jungle circuits.

100. The trees in the line are all cut down, but not entirely removed; and the natural difficulties of the country are increased by innumerable chains of elephant pits, over which it runs, that require filling up. A young forest has sprung up on the road since it was made only two years since, and the whole is covered with a dense grass jungle of enormous height; so that it is difficult, but for the long vista on either side, to know when one is on the road at all. It is sufficiently marked, to prevent one losing the road in the forest,—no slight advantage,—though probably much more travelled by wild elephants and tigers than by man.

101. From the dense nature of the forest it was of course difficult, indeed impossible, to fix the points of the lower range of hill trigonometrically in carrying the circuit along the road.

102. *Road from Sandah to Huldwanee.*—A cut, and very good road fit to drive on, has been made through the forest from Sandah on the Sookee, to the Gowlah, opposite Bumourie, over which it is intended to throw a suspension bridge, with a branch to the flourishing market now rising to the dignity of a town at Huldwanee.

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103. *Wild animals and sports—Elephants.*—These forests are famous for the number and variety of the wild animals. The elephant roves in large herds over the whole extent, and attains a size, I believe, never met with elsewhere: some of the large males are said to be upwards of twelve feet high, and are very mischievous and savage, often killing numbers of people, and creating great terror among the Puharees. They are occasionally caught in pits, and many parts of the forest are covered with these traps, making it dangerous travelling.

104. *Tigers.*—The tiger occasionally commits great ravages among herds of cows, but seldom attacks man. Among the cultivated tracts outside the forest his neighbourhood is rather looked upon as an advantage than otherwise, scaring away pigs and deer. Tigers have become much less numerous within the last few years, from the inroads of European sportsmen among them, or are far more cunning in eluding pursuit than formerly; the difficulty in killing them being inconceivably great, compared with former times.

105. *Leopards, &c.*—The leopard, hyena and bear, are also common.

106. *Deer.*—Of the deer tribe, the jerao or sambur, the cheetul or spotted deer, and the neelgaee, are numerous in the forest; the maha or bara singha, and the para or hog-deer, about and in the swamps. The four-horned antelope is met with on the edge of the forest low down, and the common antelope in the savannas outside.

107. *Pigs.*—Pigs are everywhere numerous, and so destructive, as to prevent the more valuable crops, such as sugarcane, which the soil is well fitted for, being grown at all. The porcupine and other small animals are numerous.

108. *Boa Constrictor.*—The Boa Constrictor is occasionally seen dragging his lazy length along the surface of the swamp.

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109. **Wild Buffalo, &c.**—The wild buffalo not long since roamed in vast herds in these parts, and even as low down as Pilleebheet, where they have been killed. The plain of Bunbussa was a favorite resort; they are now scared across the Sardah, and are not common there.

110. **Rhinoceros nearly extinct in these forests.**—The rhinoceros, once known here, has also been driven eastward; and two killed last year within a few miles of the Sardah, (the only ones for several years,) are supposed to be the last of the race left.

111. **The Turai.**—The Turai commences immediately below the forest, which often terminates at a high bank, where the streams absorbed by the shingle again make their appearance at the surface.

112. **Description and History by Mr. Batten and Captain Jones.**—Mr. Batten has given its history from the times when it was a flourishing, and perhaps a comparatively healthy district, and, with Captain Jones and others, has described it in published papers.

113. **General character and swamps.**—The general character is a broad plain, the higher lands being covered with a fine silky grass (Byb) extensively used for making string, "ban," and becoming coarser and higher towards the lower ground. And the swamps, for which this country is so remarkable, are covered with a gigantic reed, 30 feet or more in height, and thick in proportion, with a white feathery top, so that a swamp at first sight appears to be the highest ground in the country. The moonj, a finer kind of string, used for stringing *charpaes*, is made from the fibres of the high grass.

114. **Springs at the head of the Turai.**—In the upper part of the Turai, the springs are seen oozing from the sides of the nullahs, with a red oily scum, oxide of iron, forming I believe the coloring matter. This covers all stagnant water, and the wells, if not constantly drawn off.

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115. *Constant running streams offer facilities for Irrigation.*—The rivers running through the Turai have often trees, and a good deal of low jungle, about them. The small streams are very numerous, and always running, offer great facilities for irrigation, which are readily taken advantage of by the Tharoos; and from their carelessness as to what becomes of superfluous water, a good deal of harm is often done by their bunds, and swamps caused, where, but for them, they would not exist. They are themselves thoroughly indifferent in the matter, rather preferring the neighbourhood of a swamp than otherwise.

116. *Its unhealthiness.*—The natural moisture of the soil, and the heavy dews, combined with its richness, make it exceedingly desirable land for cultivation, little labour being required in tillage; but the same causes, with bad water, and perhaps the excessive heat during the day, and cold nights, the exhalations from swamps, malaria from the forest, and other causes, render it impossible for other than Tharoos, or regularly acclimatized people, to engage in it.

117. *Destruction by game.*—The ravages of wild animals, from the enormous quantity of game of all descriptions that regularly feed on the crops, are a most serious item of loss, and the devices for destroying them, catching or scaring them away, are innumerable.

118. *Prospect of improvement.*—With the draining of the principal swamps, as I hope to see soon accomplished, and destruction of detached forests and jungle, which forms cover for wild animals, this nuisance will be greatly abated. The substitution of properly-constructed canals, if private, under some sort of supervision, for the objectionable ones at present in use in many parts, will do more still for the district, and perhaps gradually have an effect upon the general health.

119. *Attention required to prevent swamps forming from natural causes.*—The rivers and streams not used

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for irrigation also require much attention, coming down with great violence, loaded with trees and rubbish, which form obstructions, and cause a change of course, the old bed becoming a swamp.

120. *The Tharoos.*—The Tharoo inhabitants, as mentioned in the former report, notwithstanding the deadly nature of their country, are a stout, healthy-looking race. Something of this may be ascribed to good living, and cleanly personal habits and domestic arrangements. They are fond of drink, and, during the cold weather, much given to merry-making of all kinds, which their large profits, after paying all dues, enable them to indulge in, to their full content;—fond of sport, as might be expected, and by no chance engaging in trade, for which they have a great aversion. There are no bunniahs in their villages; so that travellers must carry their provisions with them, or trust to charity; and they are a liberal, open-handed people. Their chief article of food is rice.

121. *Bunjara and other inhabitants: habits and sports.*—The other inhabitants of the Turai are the wandering bunjaras, who come to graze their cattle, and remain in their *sirkee* tents through the hot weather, and, I believe, the rains also. The climate does not seem to affect them; they help to keep the game under, and, aided by their dogs, must kill a great number of animals. They stretch a long net across the grass, on poles, which falls forward on anything running against it, and drive the game to it, catching deer, pigs, and occasionally a tiger. I was once just too late to see one so caught; he broke out as I reached the place.

122. *Rice, Tobacco, &c.*—The Turai is famous for its rice and tobacco; the *tinnee*, or wild rice, grows in the Mala, and other swamps.

123. *City of Pilleebheet.*—Before taking leave of the Turai, some account of Pilleebheet, the great mart for its produce, will not be out of place.

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124. The present flourishing city of Pilleebheet was, I believe, founded by Nawab Hafiz Rehmut Khan, about 90 years since. He surrounded it with a wall, and also enclosed a citadel, or fortified palace, erected a large and handsome Jumma Musjid, on the plan of that at Dehli, built a fine bridge across the Kukra, and other works, to immortalize his name.

125. It probably took its name from the old village of Pilleebheet, about a mile to the north, said to be derived from "*peela*," yellow, and "*bheet*," a wall.

126. *Its rapid rise.*—During the troublous times, and favored by the protection of the neighbouring forest, and the friendship of the hill chiefs, it rapidly advanced in prosperity, and the greater part of the timber trade of Upper India passing through it, with the enormous rice trade for which it is so famous, make it a place of great resort. Its population, by the last census of 1853, was 26,760 inhabitants, and 5,897 houses.

127. *Public Buildings.*—It possesses many musjids, among them handsome buildings; a number of temples, some of them with dhurumsalas attached, and on a large scale. Many of the rich merchants and bankers have fine large houses and gardens, and the whole city is well shaded with fine trees, so as to prevent a view being obtained from any point.

128. Though founded by a chief of such magnificent ideas, the arrangement of the interior of the city seems to have been left to chance, and had all the faults of native cities in general; crowded, narrow, crooked streets, though there is no want of room within the walls; swamps and filthy ponds allowed to exist in every part, and holes excavated for building in every direction.

129. *Improvements in progress.*—In this respect, however, great improvements have taken place lately, and are still going on, under the energetic management of the present Magistrate, the Hon'ble Mr. Drummond, and his

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indefatigable ally, Tehseeldar Ameer Ali. A spacious and handsome gunge, 750 feet long, by 300 feet broad, bearing Mr. Drummond's name, having three broad streets, with neatly-built shops on either side, and handsome gate ways, over which are the kotwalee and tuhsil kutcherry, town-hall, and other public offices, with broad streets traversing the whole length and breadth of the city. The old chowk, which, by the gradual encroachments of the shopkeepers, had hardly a footpath left, widened out. A beautiful public garden on the banks of the Deoha; the old city wall nicely sloped, and forming an agreeable lounge, much frequented by the better class of citizens. A handsome school, 150 feet in length; all these have sprung into existence within the last three or four years. It also boasts a substantially-built dispensary, humaums, &c. The old excavations have been filled up in every quarter of the city; or, where too extensive, drained, and the unhealthiness of the city, for which it had a bad reputation, greatly improved. A new road has also been made inside the city wall for the timber carts, which relieves the streets of the city of this immense traffic.

130. *District roads, and improved communications.*—From the city diverge roads in all directions to Bareilly and Shahjehanpore, to the Gujrowlah, and Chorghattea ghâts on the Mala, to Moondea ghât on the Sardah, *viâ.*, Mahofe to Neorea, to Birmdeo to Bumouri, *viâ.*, Victoria Gunge, and to Jehanabad and Buheree.

131. These will be of the greatest possible benefit to travellers, and to the trade of the district; they are generally temporarily bridged with logs laid across the nullahs, which answer well, and timber being cheap, are easily repaired. A few lattice bridges are already beginning to make their appearance, and will, ere long, if the present rate of improvement holds on, generally succeed the temporary "putlees."

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132. *Trade in Timber and rice.*—The trade of Pilleebheet is in timber, to which it owes its chief importance, supplying the greater part of the Upper Provinces; and rice, for which it is so renowned all over India, there being some descriptions only grown about the swamps of this district, that are highly prized by connoisseurs in such matters, and command enormous prices in the market.

133. There is also a very extensive trade in tobacco, goor, bamboos, *bent*, or rattans, &c.

134. *Boat-building and Hackeries.*—Numbers of boats are built here, and loaded with timber, &c., sent down the Deoha for sale, and a large portion of the population is employed in manufacturing hackeries, which are despatched to all parts of the country. I believe most of the Delhi salt hackeries are made here.

135. I do not think the principle of the common cart is properly understood or appreciated; it is well known that they will carry two or three times the load of a cart built on European principles, though with the advantage of superior workmanship, with equal ease to the bullocks; but to see the loads of timber they bring out of the forest, over wretched roads to Pilleebheet, is perfectly astonishing; some of the largest "lutthas" are over 200 maunds in weight, or between 7 and 8 tons, being drawn by from 4 to 6 pair of bullocks. The load of a London dray horse, on a very good road, is only 2 tons; and I am informed by a highly respectable merchant of Cawnpore, that he has loaded a boiler weighing 12 tons, on a 6-bullock cart; so the carriage must possess wonderful advantages, to admit of such a load being carried. They are enabled to do this from having a bearing outside the wheel, admitting of a very small axle, less than one-half, or a third of what would suffice for a cart to carry the load on the other construction, and the friction is of course reduced in proportion. The subject is well worthy of consideration in the construction of devil, or timber carriages, and indeed in

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every description, where lightness of draft is the chief consideration.

136. The other manufactures are *taut* for Bunjara bags, and other purposes. This is also made extensively in the surrounding villages.

F. J. BURGESS, Lieut.,
Revenue Surveyor.

East Rohilkund Survey Office:
Cawnpore, 24th Nov., 1853.

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No. 9.

GENERAL NOTICE OF PERGUNNAH MOHOBAH.

General notice of Pergunnah Mohobah. By Lieutenant F. J. Burgess, *Revenue Surveyor, Bundlekund Division. Dated 10th November, 1854.*

I shall defer giving a complete general account of this pergunnah, until such time as the survey is complete; but as the subject of irrigation, and improvement of this district, is now receiving the attention it deserves from Government, and as any information may be valuable, I will give the result of my own observations in this neighbourhood, as far as may be generally interesting.

Picturesque situation of the ancient city of Mohobah.— Mohobah is situated on the water-shed line between the Dussaun and Ken rivers, the drainage tending from the city of Mohobah, in the centre, to all points of the compass. The city, the ancient capital of the Chundel Rajpoots, lies in a situation of great natural beauty, which no expense has been spared to improve, by all that art could do.

In front lies the Muddun Sagur (Sea of Delight), an extensive lake; its arms running far back, and half enclosing rocky tongues of land, surmounted by picturesque temples, give the idea of numerous islands, of which there are also several in the lake.

On one of these, apparently of artificial formation, is a picturesque old Chundel temple, a monument of their mechanical as well as architectural skill, entirely built of granite, deeply and quaintly carved, quarried in the neighbouring hills : many of the blocks are of enormous size, weighing fully 7 or 8 tons ; they have apparently been cut, or split, by the insertion of short iron wedges in a line of holes.

This temple is in a ruinous state; has probably been destroyed by the bigotted Mussulmans, in their raids through

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this province; but from the massive nature of the structure, it will yet stand for ages, if left alone.*

Character of Chundel Temple.—It consists, like most temples of this class, of an open portico, supported by pillars, carved with the universal bell-ornament of the Jain temples, leading to a small inner apartment under a massive tall spire, every part of the exterior carved and ornamented to the summit.

Near this is a second island, also artificial, connected by a stone causeway with the shore. There has been an extensive building here, but only the stones of the platform, or basement, and piles of huge carved blocks of granite, remain to show what the extent was. There are also a number of elephants, richly caparisoned, and beautifully executed, in white sandstone, thrown over into the water; these are nearly the size of life, and cut out of single blocks, which must have been transported from a great distance, there being no such quarries nearer than the Ken river I believe.

On the hills round this and the adjoining lakes are placed "*baituks*," open, pleasant summer-houses, supported on carved stonepillars, under shelter of which the old chiefs enjoyed the cool breezes from the lakes, and which add much to the beauty of the scenery.

Beyond the lake, (to which the lotus, in its season, also lends its beauty,) in bold relief, stands a rugged hill, that from the extraordinary way the stones and rocks are piled

* The most perfect of these works, at present in existence or known, are the famous temples at Kujraeepore, near Chutturpore, which afford almost a solitary instance of escape from the bigotted zeal of the Mahomedan idol breakers, though covered with sculptures of so obscene a nature, that one would suppose they would hardly have left them. They are said to be an expiatory work of the female founder of the Chundel race; and that when the followers of the prophet attempted their destruction, in common with other temples, the anger of the gods was manifested in so remarkable a manner, that they were compelled to desist.

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on one another, light being visible through the crevices, may well be said to be the work of demons.

The town runs along the north border of the lake, partly on the artificial dam which forms it, all this side being covered with ghâts and steps of dressed and carved granite, surmounted by numerous temples, and musjids converted from the old Jain temples, and retaining their corridors or cloisters.

The city has been surrounded by a wall, also of squared and dressed granite blocks; for the old Chundels had no idea of using stone in any other shape, however hard its nature; and some of the gates are still in existence.

State of this Lake.—The lake has silted up very considerably, and has in some seasons been quite dry; it is said that the unhealthy exhalations from it caused the desertion of the city. A good deal of the area is covered with *singhara* cultivation, which has the character of being very unhealthy, and rapidly raising the bed of any lake where it is grown.

Pawn Gardens.—There are extensive *pawn* gardens on its banks, watered by hand from the lake, and irrigation is carried on round the edges by manual labor. To take water extensively from this lake for the lower irrigation would be a sacrilege no one would think of; every effort should be made to increase the amount of water, and keep it as deep and clear as possible. The rotten black decayed weeds might be used with great advantage as manure, and its removal would improve the health of the town, much of which, lying below the level of the lake, is excessively unhealthy.

To the east of the city are some extensive buildings, comparatively modern, and in ruins, said to be the palaces of the chiefs of the Bunjaras, or grain-carrying tribe.

Other Lakes in Mohobah.—The Collector's report contains a list of 31 lakes in this pergunnah, including the Muddun Sagur, four of which,—the Kherut Sagur, Kalian

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Sagur, Ruhelia and Beejanuggur,—are in the immediate neighbourhood, and the Puswara, or Thanah lake, at no great distance. I have carefully inspected all of these, and add the following remarks regarding them.

The Kherut Sagur.—The Kherut Sagur is immediately north-west of the Muddun Sagur, and is well adapted for irrigation,—has an extensive area, and is deep and clear. It is some 60 feet above the plain beyond Mohobah. The bund is formed of two massive walls, enclosing an earthen dam. There is no escape; and though hitherto, as in many others, an escape may have been unnecessary, as the beds silt up, and the available space for the water is reduced, it may in some cases be necessary to give the surplus water the means of discharge without damage at once, (as at Beejanuggur, which, though since its formation for 200 years or more, has stood without one, has of late years had some very narrow escapes,) and all will eventually require it.

Escapes in some cases immediately necessary, and eventually in all.

Pawn Gardens.—Below the Kherut Sagur lake are very extensive pawn gardens, watered by springs from under the bund, which is by no means in a perfect state of repair, and requires a thorough examination.

Proposed to use the Kherut herut Sagur for irrigation.—I would recommend this lake to be at once adapted for irrigation, by means of sluices placed at the junction of the bund with the hill. The canal carried under the road might work mills, and for which the great fall renders it well fitted, and then branch out to the lands below, as might be desired.

Old irrigation works, and attempts at others, proposed to be carried out on an extensive scale.—Beyond the Kherut Sagur is a line of stone dams for upper irrigation, all of which might be repaired at small expense, and with much profit. Several attempts have been made

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to bund the nullah running from this lake, or rather taking its rise below.

There are the remains of many old dams some distance down the valley, and I would strongly advise this plan to be carried out effectually by means of a series of dams, as far as Kubraree, or even beyond.

Facility for carrying it out.—From personal observation, I feel persuaded there will be no difficulty in doing this; and that the outlay, though great, will repay itself. I would thus convert the lower part of this valley into a succession of reservoirs, that would hold up sufficient water to be used for the irrigation of the country miles beyond, in addition to the whole extent of the valley itself, at present nearly waste. The whole line of the nullah offers great natural facilities for carrying the plan out; detached hills and rock offer everywhere secure points for the ends of the bunds to rest on.

The Beejanuggur and Puswara lakes both fall into this valley, and there are several old works below the former, a large bund on which is the village of Kuraree, and a second, of considerable extent, by the Banda road, which has been broken through, and should be at once repaired; besides a number of smaller ones, mostly broken through.

Ruhelia Lake and Temple.—The Ruhelia lake is very shallow, probably silted up. Some irrigation appears to be carried on here by Persian wheels worked by bullocks,—an enormous waste of power, when a mere hole through the bund would answer the purpose, and save the expense; and the whole bed is cultivated as it dries up.

There are the ruins of a remarkably fine temple and other buildings on the bund, itself finished in the usual costly style of Chundel works,—a circular portico, or vestibule of large size, covered by an elegantly carved domed roof of sandstone, supported on granite pillars, connected by a passage with the dungeon-like temple under the spire.

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Bund should be repaired, and provided with sluices for irrigation.—The bund appears to me very defective, and there are some arrangements I was at a loss to understand; it should be thoroughly examined, and I believe will repay a complete repair. Sluices of simple construction should be provided; a slab of stone, pierced with holes for plugs, would do very well.

Kalian Sagur.—The Kalian Sagur is nearly silted up, and an unimportant work in its present condition. I directed a cut to be made, to carry off the surplus water of this tank into the Beejanuggur lake.

Beejanuggur.—The Beejanuggur lake is the largest in the pergunnah, covering an area of more than a mile in extent, and a clear deep sheet of water. From the evident advantages of situation of this lake, I was led to propose bringing it at once into play for irrigation, as a pattern for others, and my proposal having been favorably received by Government, the works were commenced under my directions; they are now in a fair way towards completion, and will, I trust, be shortly in use.

Puswara Lake.—The Puswara, or Thanah lake, the latter village built on the bund formed to close a narrow gap in the hills, through which the valley formerly drained, is prettily situated among rugged, detached hills, almost surrounded by it, and affording beautiful views at every point. The surplus water escapes through a natural depression in the ground to the valley to the east. I would recommend the construction of a dam about 3 feet high at this point, or 5 below the top of the bund, with irrigation sluices to carry one set of canals down this valley, and a second set for the irrigation of the fine valley below the bund.

Proposals for irrigating from it.

Kubraee bund.—There is a very extensive embankment at Kubraee, finished in the best style of Chundel work, but enclosing only a very shallow lake. Simple sluices might be fitted to this, as in the Ruhelia lake, which it, in some measure, resembles.

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To the above only has my personal observations extended, but when the re-survey of this pergunnah is complete, I trust to be able to point out in detail where improvements may be carried out, that will entirely change the face of the country.

Proposed bund in Nuthoopore, Jewunkhera.—I would also strongly recommend the construction of a dam across the nullah, near where the road from Mohobah to Chirkaree crosses in Nuthoopore, Jewunkhera; the situation is particularly favorable: between two quartz rocks and the bottom of the nullah, rocky throughout, which would admit of the sluices being built in the bed, water might be carried into the now waste lands of that village, and of Punwaree beyond.

Irrigation will enable superior crops to be grown.—The introduction of this system of irrigation will enable crops of the most valuable nature to be grown in place of the comparatively poor ones. Wild indigo is found abundantly everywhere; it has been, and is still I believe, cultivated on a small scale in Jeitpore and Mohobah, and would probably be extensively cultivated under the improved state of affairs.

In the opinion of a gentleman, Mr. Inman, who has had considerable experience in Assam and Hazareebagh, Chota Nagpore, the slopes of the hills, to which the water may be easily carried, are admirably adapted for the growth of tea and coffee. I give no opinion on this point myself; but as the success of such an experiment might be attended with results of the utmost importance to the district, it might be worth while to try it.

As regards the increased value of sugarcane so grown, I suppose there is no doubt, and this alone would effect an important change, while the produce might be crushed at a very trifling expense, by mills driven by the water-power available from the lakes.

History of the Lakes.—In regard to the history of these lakes, those with cut-stone bunds are generally attri-

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buted to the Chundels, and the others to, or about the time of, Chuttur Sal, or his immediate descendants. It is said that the lakes at Beejanuggur, or Beejporea, as it was then called, Sijjuree and Powar, were originally formed by the Gairwar tribe of Rajpoots, 1,000 years since, and that the son and Dewan of Rajah Chuttur Sal, Mohun Singh, raised the Beejanuggur bund to its present height, built the palaces and buildings below, and on the bund and rocks above.

The hills surrounding this and the Puswara lakes have walls carried over and round them, sufficiently large to prevent the escape of game, with numerous ruined buildings for sport, and the whole was perhaps a large game-preserve.

That Chundun Birm, a powerful chief of the Chundel tribe, formed many lakes, and built numerous palaces, temples and bowlees; that Ruheel Birm built the Ruhelia bund; Muddun Birm the Muddun Sagur; Keerut Birm the Kherut Sagur; Ruttun Birm the Oorbara lake; Roop Birm the Puhra lake; and Bal Birm, the founder of the fort of Bareegurh, the Kubraee lake. All these were Chundel chiefs. That Purmal Chund Mull built the city and fort of Mohobah, (but according to Colonel Pogson, Oordia Jeet founded Mohobah,) and made it the seat of government, and between his heir, and Pirthee Raj, there were sevenRajahs, when the Chundel dynasty expired about 775 years since·

Of the history, however, of this part of Bundelkund little appears to be known satisfactorily. Colonel Pogson's work, professing to be a history, is nothing more than a translation of the *Chuttur Purkash*, an epic poem describing the wars of the famous Rajah Chuttur Sal, who was born about 1649 A. D., from the time of the Chundels, to which nothing is authentic. Perhaps the laborious researches of Major Ellis may be rewarded, by throwing some light on the subject.

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No. 10.

JHANSIE, AS A COMMERCIAL TOWN.

From Lieutenant F. D. GORDON, *Deputy Superintendent of Jhansie, to the* SUPERINTENDENT *at Jhansie, Camp Saugor, No. 307.—Dated Camp Jhansie, the 27th December, 1854.*

IN accordance with the requisition of His Honor the Lieutenant-Governor, I have the honor to submit the following rough sketch of the importance of the position of the town of Jhansie, in a commercial point of view.

2nd.—Jhansie, originally known by the name of Bulwunt-nuggur, was colonized from Oorcha. The fort is said to have been first constructed by Bir Singh Deo, one of the ancient rulers of Oorcha.

3rd.—In Sumbut 1801, A. D. 1744, when the army of the Peshwa, under Naroo Sunkur, the first subadar of Jhansie, overran this part of India, Jhansie had already risen into a place of some importance. It was selected by him as his headquarters, and the fort was much increased.

4th.—It does not clearly appear when first the ancient name of Bulwunt-nuggur was dropped, and that of Jhansie substituted; nor have I been able to ascertain the meaning of the word Jhansie, nor whence derived.

5th.—The influx of wealthy Mahrattas from the Deccan, and large bands of Gosains, soon caused the town to increase in importance. The numerous large and well-constructed houses, wells, tanks and enclosed gardens, still extant, are a clear proof of the wealth and importance of the former inhabitants.

6th.—The city was first walled in by Sheo Rao Bhao, the subadar of the district, from sumbut 1853 to sumbut 1871. Since his time it has remained much in its present state. There are no indigenous manufactures, nor any

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local causes, to render it probable that the town will, at any future time, be much increased in size. The present population is calculated at about 40,000 inhabitants.

7*th.*—Its importance is derived solely from its centrical position. At this point five important branches of roads converge: 1*st,* the high road from the north, including Agra and Gwalior; 2*nd,* that from Cawnpore, Lucknow and the east; 3*rd,* that from Nowgong and the south-east; 4*th,* the road from the south passing through the valley of the Nerbudda; and 5*th,* the roads from Esagurh, Sepree and Indore on the west.

8*th.*—The traffic of every description is enormous. Grain from the south, and from the fertile districts of Bhilsa, Bhopal and Malwa to the south-west, transported on thousands of bunjara bullocks, and, where the roads permit, on large carts, passes daily towards the north. From the west a large trade in cotton is carried on, all of which is conveyed to Calpee, being the nearest point whence water-carriage is procurable; in exchange for which the carts, &c., return laden with sugar, kirana, &c., intended for Indore, and the country to the west.

9*th.*—From the west the traffic in salt is enormous. The following is a rough estimate of the value of the goods which pass annually through, or round the town of Jhansie. Salt is by far the largest item. The tax upon this article, levied by the Transit-duties contractor, is about 5 per cent.; and as the income derived therefrom is about Rs. 25,000, it would appear that not less than 5 lakhs of rupees' worth of salt pass annually through the town or suburbs of Jhansie.

10*th.*—The duty on sugar is about 1½ per cent.; and as the income derived from that item alone is calculated at Rs. 10,000 a year, not less than 6½ lakhs of rupees' worth of sugar may be estimated to pass annually through or round the town.

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11*th.*—Of other miscellaneous articles, which are taxed in transit, about 3¾ lakhs of rupees' worth annually pass, and swell the income derived from this duty to not less than Jhansie Rs. 48,000 a year.

12*th.*—This is independent of grain, which passes through the district untaxed. The value of this article alone must equal, if it does not indeed exceed, that of all the others; I shall therefore be within bounds, when I put down the value of the goods of every description, which pass annually through the town of Jhansie, at 30 lakhs of rupees.

13*th.*—Such has hitherto been the amount of traffic under a native ruler, when the merchants and transporters of the goods had of necessity to submit to the vexatious levying of transit duties, when it is but reasonable to suppose that they would rather have taken a longer road, and, if possible, have avoided the payment of the impost.

14*th.*—Improved roads, and greater facilities for traffic, combined with the abolition of the present transit duty system, will, it is confidently expected, cause a vast increase in the amount value of the goods which will annually or round pass through Jhansie.

15*th.*—The entire line of road now runs through British territory, from the Jumna to the banks of the Wurdah, separating Nagpore to the south from Hydrabad; and goods should pass uninterrupted, free from any kind of hindrance or taxation on the part of the petty subordinate Thakoors and others, who happen to reside on the line of the road.

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No. 11.

REPORT ON THE NATURAL PRODUCTS OF BRITISH SINGROWLEE, ZILLAH MIRZAPORE, &c.

From W. Roberts, Esq., *Collector of Mirzapore, to* H. C. Tucker, Esq., *Commissioner, 5th Division, Benares, No. 270.—Dated Mirzapore Collectorship, the 27th July, 1854.*

I have the honor to report regarding the produce of Singrowlee; and, 1*st*, of coal.

2. The coal formation is situated on the western boundary of Singrowlee; the northern limit being in the neighbourhood of the Oundee hill, latitude 24° 12′ 21″, longitude 82° 43′ 51″, which is itself of igneous formation; the southern, the Bullea rivulet. The eastern limit has not been exactly ascertained, but it does not extend beyond the Rehund river. There is no doubt that the coal field extends some 30 miles west of our territory in Rewah, Singrowlee and Burdee.

3. It seems, then, that in British Singrowlee we have a mere outskirt of a great field; and the continuity of the bedding of the small tract is believed to be interrupted by a dyke, or fault. The strata are nearly horizontal, the dip being slightly to the north.

4*th*.—The workings are prosecuted in a basin, within a boundary of Kota; they go from 40 to 50 feet below the surface. The aggregate thickness of the several coal seams, in 1849-50, was reported as being 38 inches. But latterly some thicker seams have been met with; one is more than a foot in thickness. It has not been ascertained whether deeper borings than 20 feet lower than the present workings would give a finer description of coal.

5*th*.—The quality of coal has been acknowledged to be good. It was found, on trial, that for steaming

1*st*.—Consumed 42 maunds of Contractor's (Burdwan) coal, or at the rate of 14 maunds per hour, with residuum 13 maunds 10 seers.

2*nd*.—Durschmidt's coal, (*i. e.*, Burdwan also,) consumed 42 maunds; residuum 11 maunds 20 seers.

purposes, 11⅓ maunds of Burdwan coal. It was remarked, however, that the Singrowlee is of a very friable nature, and will probably be found to deteriorate quickly by exposure. This however is an inference requiring confirmation.

3rd.—Singrowlee coal, consumed 34 maunds, residuum 6 maunds 20 seers, or 14 maunds of each description of Burdwan coal per hour, to 11⅓ of Singrowlee.—*Controller of Government Steam Vessels, to Secretary, Superintendent of Marine, No.* 893 *of* 1850, *dated* 14*th May.*

6th.—Recently Captain James, of the 32nd N. I., has also pronounced favorably of this coal, from the analysis of the sample sent from this to the Great Exhibition in 1851. This letter, on the subject of this and other coals, was referred to Professor Oldham, who gives a caution against forming a conclusion as to the quality of the mineral, from one solitary hand specimen; and who also thinks no conjecture as to the subjacent seams can be formed, without the examination of the coal field by competent authority.

"The superior quality of Singrowlee coal is well worthy of notice, from its superior illuminating qualities; and if, as Mr. Thompson supposes, it overlays a bed of Cannel-coal, the fact is a very interesting one, as that description of coal is now selling in Scotland for £2½ a ton, or nearly 7 annas a maund, at the pit's mouth. Should it be introduced into Calcutta, it would doubtless pay the Company to import such coal from so distant a place as Mirzapore."—*Captain H. C. James, 32nd Regiment N. I., to Secretary to the Government of Bengal.*

"With reference to the Singrowlee coal, referred to by Captain James, I have never even seen specimens of it, and cannot therefore offer even an opinion regarding it. But with regard to the supposition of Mr. L. Thompson, (adopted by Captain James,) that it overlies a bed of Cannel-coal, I am bound to state that it is totally impossible for any person, however an experienced miner or geologist he might be, to state (and more especially from hand specimens,) regarding an unexplored district, what beds, or of what kind, may occur under others."—*Superintendent of Geological Survey, to Under-Secretary to Government of Bengal, dated* 16*th February*, 1854.

7th.—Captain James is clearly of opinion that the coal is well suited for the manufacture of Gas.

8th.—The quality of the mineral is then decidedly good. It has not been tried on an extensive scale, because it has not been made available to the public.

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9*th.*—But as we are soon to have Railway operations here, and the demand will be very considerable, it is desirable to have the field examined, as to the depth of the coal-bearing strata.

10*th.*—It has been said that three lakhs of maunds will be required for the works of the Railway, chiefly for ballast; probably the kunkur and sandstone rubble, in the neighbourhood of the Chunar and Mirzapore line, will lessen the demand. Still it is anticipated much coal will be required.

11*th.*—It is therefore highly expedient to determine, on competent authority, whether the British Singrowlee coal field supply can supply the wants likely soon to be felt, or whether the supplies must come from another quarter.

12*th.*—I would therefore urge that measures be taken to secure the survey of this field, by one in every way qualified to give sound information on the subject, in order that it may be ascertained how much of the coal there is in our territory to meet the coming wants of the Railway.

13*th.*—The difficulties in regard to carriage have been frequently dwelt upon; the mode of overcoming them has been pointed out in No. 7 of *Selections**. The route to Chunar and Benares should by all means be speedily taken in hand. It is even now much frequented.

* From the *Records of Government*, North-Western Provinces, Part XII.

14*th.*—It has been calculated that 500 bullocks in eight months, in all 40,000, can bring in one lakh of maunds. I doubt whether during all the eight months more than 25,000 can be procured, consistently with the demand there is here for this carriage for other articles of traffic. At present 4,000 are all that can be procured, as the demand for Deccan cotton in Bombay, and the failure of the import of Sambhur into Singrowlee, has this year operated to reduce the number of bunjara traders.

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15*th.*—Supposing there exists a sufficiency of good coal, to supply immediate wants, still, by reason of the want of carriage, it will not be available.

16*th.*—The coal field in our territories has yet to be explored, to ascertain what is its area, and at what depth real good coal can be obtained; whether if its area should not exceed, or even be under 10 square miles, there is yet a sufficiency of the mineral to supply immediate wants; at the same time the coal is known to be of a superior quality, but for want of proper roads, its transport to any considerable extent is out of the question.

17*th.*—I have stated before my belief that, in the Rewah territory, there is a very extensive coal field. But at the same time I must state that the reluctance of the Rewah durbar to have any transactions with Europeans, the aversion of those authorities to granting long leases, and the distaste for opening out the communications, are at present almost insuperable obstacles to mineral resources being made available for the wants of British subjects. In time, doubtless, these difficulties will be surmounted. Meanwhile, until they are overcome, we should make the best use of the limited resources that are now open to us.

18*th.*—There is no other mineral product in Singrowlee, as far as my knowledge extends, that is extensively developed.

19*th.*—The next in importance to coal is iron; but good iron ore is not extensively developed in our territory. In British Singrowlee, in the neighbourhood of Kota Kullan, I thought I observed iron ore of a fair quality. However Mr. Burke, of the coal mines, gets iron ore from Hindowa, in Rewah Singrowlee, some four or five miles from the mine. He tried the experiment of smelting, and found that though his iron was much superior to the country irons, it did not fetch a remunerative price in the market.

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20th.—His furnace, and the general character of his operations, were much superior to the native smelters; but to produce iron that shall answer, it will be necessary to construct furnaces, and carry on operations according to the European methods.

21st.—At Khairahee, on the Rehund, about 30 miles north-east from Kota, there are eight native furnaces. On the Ujjur nuddee, there is here and there a solitary smelter; but whether the iron ore is of a quality to suit the wants of future iron smelters, is beyond my competency to pronounce.

22nd.—Out of Singrowlee, about 30 miles north of Kota, in Pursooee and its neighbourhood, is iron ore of reputed excellence. There are about ten native furnaces.

23rd.—At Oobra, on the Rehund, a place was pointed out, where the ore was thought to be very good; it was most advantageously situated on the river bank, and close to large deposits of grey argillaceous limestone. But recent experiments have shown that the supposed ore is very inferior. It comes out of the furnace in the shape of slag. In truth, if there be any iron ore, it is too mixed with schist, to be made available for ordinary furnaces.

24th.—Still it is desirable that the places should be examined, and all doubts as to their capabilities set at rest. The Government will know whether there is sufficient prospect of public good, to justify any large outlay in opening up the communications. An experienced eye will at once pronounce whether there are sufficient indications to warrant a more minute explanation, or whether the country, and its lithological character, is adverse to the probability of there being great mineral wealth.

25th.—It was whispered to me that copper was found in the early days of British dominion, but the discovery of it was suppressed, lest the notice of the ruling power should be attracted to the country; however, I could discover nothing in the locality thus indicated.

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26*th*.—Much of the pergunnah is of the slate formation, but we have not yet found any slate that is fit to be quarried. But then no practical man has examined the country.

27*th*.—The entire trade in other articles is estimated by the Ahrora bunniahs at 2½ lakhs per annum. They have no reasons for overrating the traffic. It is probably much more.

Export.	*Value.*		
1.—Grain, ...	21,540	0	0
2.—Ghee, ...	60,000	0	0
3.—Sticklac, ...	80,000	0	0
4.—Oil, ...	10,400	0	0
5.—Kirana, ...	9,240	0	0
6.—Dying fruits, ...	1,152	0	0
7.—Spices, ...	1,620	0	0
8.—Iron, ...	4,000	0	0
9.—Badh, Buggao and Kendaree,...	1,500	0	0
10.—Rafters and Timbers, ...	7,350	0	0
11.—Miscellaneous, ...	7,684	4	0
	2,04,486	4	0

Import.	*Value.*		
5.—Kirana, ...	600	0	0
6.—Saccharine produce, ...	4,800	0	6
7.—Salt, ...	37,141	0	0
8.—Spices, ...	439	0	0
9.—Cloths and Blankets, ...	3,060	0	0
10.—Tobacco, ...	7,000	0	0
11.—Utensils of Brass, &c., ...	3,000	0	0
12.—Taut, ...	40	0	0
	56,080	0	0

28*th*.—I think the sticklac is much more than what is here set down;—much indeed comes by the more western routes.

29*th*.—The principal export from Singrowlee is grain. Two-thirds of the exports are from places beyond our border.

30*th*.—But it is as the highway from countries that do possess much wealth that I would invite attention to Singrowlee.

31*st*.—The further the communications are opened out, the more will the enterprizing trader be encouraged to visit distant regions, and penetrate to jungly countries rich in natural, but undeveloped resources. Even now traders venture to places more than a month's journey from our frontier.

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32nd.—I may notice, in conclusion, that search was, in 1837-38, made in the Kannoor hills for coal. Mr. Osborn, of the Opium Department, who was deputed to report on the supposed coal, reported that the Government had been misinformed. In 1848, Mr. Williams examined the Kannoor, and pronounced definitively that there was no coal. Mr. Osborn discovered, near Umlah Ghât, proto-sulphate of iron *(heerakussees)*, and also some exudations of petroleum; but the latter in no sufficient quantities to be of any use. The former he reported to be very plentiful. These substances are of use in the arts. It is desirable to know whether they are of sufficient quantity and quality to reward any one who shall be disposed to avail himself of them.

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No. 12.

REPORT UPON A PROJECT FOR A RAILWAY IN ROHILKUND.

[The Plans and Sections referred to in the body of the Report are not reprinted with this series of the Selections.]

I.—*From* CAPTAIN H. YULE, *Engineers, Deputy Consulting Engineer to Government of India, to* W. MUIR, ESQ., *Secretary to Government, North-Western Provinces.*

I HAVE the honor of forwarding, for submission to the Lieutenant-Governor, a report containing the results of a journey through Rohilkund, undertaken under His Honor's instructions last cold weather.

REPORT ON A RAILWAY RECONNOISSANCE OF ROHILKUND.

1.—In the beginning of the present year, the general course of the East Indian Railway having been determined from the lower boundary of the North-Western Government to Shekoabad, in the Mynpoorie district, and the railway staff having got to work on the details of the line, I proceeded, under instructions from the Hon'ble the Lieutenant-Governor, to visit the province of Rohilkund, in order to help as I could in maturing projects, which His Honor had communicated to me, for improving the means of transit between that province, and the countries to the westward, which afford the great market for its produce.

2.—With this object I proceeded from Cawnpore to Futtehgurh, and thence, crossing the Ganges and Ramgunga, marched by Jellalabad to Shahjehanpore, and so to Bareilly. Here some days were spent in examining the Ramgunga valley in the vicinity of the city, and in a visit to the great produce mart of Pilleebheet. From Bareilly I proceeded by Rampore to Moradabad, where again a few days were devoted to the examination of the great river of the province. From Moradabad I marched to Chundousee, one

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of the principal emporiums, where the export and import trade of the province changes hands, and thence by Sumbhul and Hussunpore to the Ganges at Gurhmuktesur. Two or three days were spent in examining and taking sections of the Ganges khadir near this ghât, and at Sherpore, 13 miles further north. I then visited Dhunoura, where much of the produce of the Bijnour district concentrates before exportation, and proceeded by Nugeena and Nujeebabad to Hurdwar. Here I quitted Rohilkund, my tour in the province having occupied about five weeks.

3.—It would be absurd, of course, to pretend to produce detailed projects of any kind, after so cursory an examination of this large tract; but I hope to lay before the Lieutenant-Governor sufficient preliminary information, to enable him, and the other authorities, to judge of the advisability of more detailed and specific investigation, and to guide its aim. The valuable mass of information regarding the trade of the province, which the zeal of Mr. Alexander and the Civil Officers under him has collected in aid of the enquiry, will of itself tend greatly to define the objects and nature of the projects required.

4.—The great staples of Rohilkund are rice and sugar; the former being produced principally in Pilleebheet, the northern parts of cultivated Bareilly, and the eastern parts of Moradabad, the latter more or less throughout Shahjehanpore, Bareilly, Budaon, to a much less extent in Moradabad, and very largely (in ratio to the produce of the zillah) in Bijnour. Rampore also produces a considerable amount of sugar, though data are of course a-wanting from that jagheer.

5.—The prosperity of the province is largely dependent on its export trade in these staples. Its principal markets are westward and south-westward. Delhi may be taken as the centre of one circle of sale; Hatrass of the other. The produce of Bijnour mainly seeks Delhi; that of Budaon mainly seeks Hatrass. The rest divide between the two,

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with at present rather a preponderance in amount towards the south-west.

By *Delhi* I mean the circle of which I have called Delhi the centre, embracing Meerut, Haupur and Khoorija in the Doab; Bhewanee, Beree and Rewaree beyond the Jumna, from which places again the produce diffuses itself in Hurrianah, Ulwur, Bikaneer, &c. By *Hatrass* I mean the circle of which I have called it the centre, commercially, not geographically, embracing Agra, Muthra, Bhurtpore, &c., and thence diffusing itself over the Jât and Rajpoot states in that direction. An intermediate train of traffic tends to Kosee and Koel, which may be considered debatable land between the two circles above indicated, and a south-easterly branch directs itself on Furruckabad. Some of the general statements with which I was favored at starting, spoke much also of export Punjabwards. I have not, however, found this confirmed by personal enquiry, or by the returns. There is a little export direct to Putteala, but even at Nujeebabad, which looks most towards the Sikh provinces, I found little trace of trade that way. The intervening Canal districts may probably have supplanted it, as well as the extending sugar cultivation of the Punjab itself.

6.—The imports bear but a fractional proportion to the exports. The principal item is salt, of the different kinds produced in the Delhi territory, and the further west. Iron comes from the Agra quarter, and European goods from Furruckabad,—the great focus of this trade for all Upper India; and some inconsiderable amount of cotton from our Jumna Canal districts.

7.—The marts of Rohilkund may be classed as of the first order; Bareilly, Pilleebheet and Chundousee, of the second; Moradabad, Shahjehanpore, Dhunoura, Nujeebabad, of the third; Nugeena, Huldour, Badlee-tanda, Richeea, and many more. Of Budaon zillah I do not feel able to speak, as I could not bring it into my circuit, and the returns from that quarter are somewhat brief and general.

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Bareilly, Pilleebheet, Shahjehanpore and Moradabad, may be called natural marts, as either great cities attracting, rather than created by trade, or as the natural centres of productive districts. Chundousee, Dhunoura and Nujeebabad, may be considered as artificial marts, which have been established by the deliberate efforts of enterprising individuals to that end, having no importance extrinsic to their merchandize, and having no advantages of locality, except of a very general kind.

From some of the natural centres of produce, as from Pilleebheet and Nujeebabad, trade passes direct to the Trans-Gangetic or Trans-Jumnatic market; from others, as largely from Bareilly and the minor marts of the Bareilly district to Chundousee, and from Nugeena, Dhampore, and all that part of Bijnour to Dhunoura, it concentrates at intermediate emporiums, where it is purchased for export by the western traders.

8.—It may be worth while to illustrate the mode of carrying on business at the marts generally, by describing the process as conducted at Chundousee, which I took some pains to ascertain on the spot, correcting my account by the remarks of Mr. Strachey, the Collector.

Other marts differ more or less in circumstance and practice, but this will give a fair idea of the general system.*

The mart of Chundousee was got up about a hundred years ago by Ibrahim Khan, a Pathan chief, who exerted himself to effect this, by reducing exactions, canvassing the men of capital *(sahukars)*, protecting traders, &c.

The site does not seem to have any special recommendation, beyond its being intermediate between the productive districts of Trans-Ramgangetic, Rohilkund and Gurhmuktesur ghât. The produce of the immediate environs

* For other particulars of the modes of trade, see the reports of Messrs. Wingfield and Strachey. Annexed Papers VI., VII., and VIII.

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I should conceive to be much below the average of the province, and the roads which run towards the Ganges are heavier and worse than any of equal length that I have traversed in Rohilkund, scarcely excepting that between Futtehgurh and the Shahjehanpore district. The place may therefore be looked on as an accident.

The trade is almost purely that of an *entrepôt*. What is exceptional to this, is the cane produce of the neighbouring villages. For this, advances are made to the cultivators by dealers, and the raw cane-juice taken from them at Rs. 12 to 15 per 100 maunds. It is then boiled at the expense of the trader, either on the spot, or in the town. The majority of the traders belong to the place. They purchase the rice and the sugar (in its various forms of *goor*, *lal shukkur* and *khand*) brought from Shahjehanpore, Bareilly, Rampore, and the northern parts of Budaon, and re-sell to the western merchants.

They also act, many of them, as brokers *(arhatiya)* between the western traders *(biyopari)* or their gomashtas, and the owners of Rohilkund produce, and salt merchants of the place. The *arhatee*, or commission on these transactions, varies from half to one per cent. The gomashtas the western merchants come to Chundousee at the beginning of the season, and stay till the rains, receiving consignments of salt from their principals under charge of *churundars* (supercargoes), with invoices, disposing of it through the brokerage of the Chundousee bunyas, and purchasing the return investment of sugar and rice in the same way.

There are also six or seven houses of *Kayán* bunyas, who belong themselves to the west, permanently resident here. These carry on their own correspondence with their native towns, and have consignments of salt made to them.

The cloth merchants also have consignments of European goods to their order from Furruckabad, and of *kharwa*

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and other native cloths from Calpee. But all the other trade is carried on, as above described, through gomashtas and brokerage, without correspondence.

The number of wheel-wrights and sack-cloth dealers in the place is astonishing, and is an index of the amount of business. This amount is however very much fallen off, it is said, within the last seven or eight years. This falling-off is ascribed partly to the frequent bankruptcies which have taken place, and partly (as Mr. Strachey told me) to the diversion of a large part of the salt trade, originating in the adulterations to which the Chundousians were addicted.

9.—There is however still a large trade in salt, and it diffuses from Chundousee at least as far as Kesrigunge, in Oudh. Produce from Chundousee goes in part to Hatras. But the great trade is with the Delhi circle, and that is what is meant by the *west*, in the foregoing statement.

The salts imported are:—

1*st.*—*Sambhur*, which sells at Chundousee for about Rs. 14 per *pulla* of 3 maunds.

2*nd.*—*Sooltanpooree*, from the Jhujjur country, at Rs. 9.

3*rd.*—*Sulumbha*, from the district of Goorgaon, at Rs. 8.

There is also a dirty salt called *Kharee*, made in the Ganges khadir, which sells at 8 annas a maund.

Of the three kinds of cane produce—

Goor.—The first result of inspissation, in damp, viscid loaves, sells at rupees 5-8 per *pulla*.

Lal Shukkur.—The result of the *goor*, subjected to pressure in a pile of coarse bags, for the extrusion of the uncrystallizable part of the juice. This is a brown, sandy-looking stuff, and sells at rupees 7-8 per *pulla*.

Khand.—This is purified by a further boiling, and then by a lengthened submission to layers of a succulent and stringy aquatic plant brought for the purpose from the Ganges khadir. "The moisture from the plant drains

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slowly through the sugar, and carries with it the dark-coloured molasses."* This *Khand* apparently corresponds to what is, in Europe, called clayed sugar. It is a fine, whitish, powdery article, and sells at rupees 24 and upwards per *pulla*. The prices of these three articles, as sold after exportation at Hatrass, were stated to me there in exactly the same figures. The inconsistency was explained by the statement that the weight used at Chundousee was the seer at 96 tolahs; that at Hatrass the Government seer. The difference (17 per cent. less) must then be supposed to cover carriage and profit. This difference would amount to Rs. 4 per *pulla* of *Khand* sold at Hatrass, (Government weight,) and taking the average cost of carriage at As. 1·8† per ton per mile, leaves about Rs. 2-8-0 on 24, or a little more than 10 per cent. to cover profit, brokerage, &c.

10.—All the Indian modes of carriage,—carts, camels, ponies and bullocks,—assist in the transport of these articles of trade. But the bulk of them is conveyed in large and heavy hackeries, carrying from 40 up sometimes to nearly 100 maunds, and drawn by 4, 5, 6, 7 and 8 stout oxen.

11.—From what has been said of the markets for Rohilkund produce, it is obvious that no one main line conveys it. There are a number of lines of road nearly parallel to one another, and all transverse to the direction of the great rivers. The roads are none of them good; many very bad; and the most used almost necessarily the worst.

By far the greater part of Rohilkund appears to be without that valuable gift, which underlies the surface of the Doab through so large an area, *kunkur*. The greater part

* *Penny Cyclopædia*, volume XXIII., page 229, to which useful book (seldom consulted in vain) I am indebted for the philosophy of this process, which the native manufacturers could not explain to me.

† *Vide* Appendix.

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of the province (at least from the Ramgunga to the Terai) partakes of the nature of the alluvial valleys of the Ganges and Jumna, known as *Khadir* in the north-west; and never presents such high and dry plains as form a large part of the Doab, and of the country west of the Jumna. Almost everywhere water lies very near the surface; the verdure, and the frequent rivers, recalling the aspect of Bengal in some degree, rather than of Upper India. *Kunkur*, so far as I have been able to learn, is found only near the Senda river, on the Oudh border, at some places on the road between Jellalabad and Kuttra; at Futtehgunge, and one or two spots between this and Bareilly, along the Pilleebheet road, at no great distance from it, as far as the 20th mile stone, and at a few other spots in the Bareilly district; scantily at some distance south-west of Moradabad, and more abundantly in the valley of the Bhugud rivulet near the Ganges.* In Bijnour it does not appear to exist. Metal has therefore been wanting, and the only pucka road of any extent in the province is that from Bareilly to Pilleebheet, now nearly completed. Brick metal does not appear to have been tried; nor of the ordinary character would it be likely to answer under the heavy description of carriage used. The inferiority of the roads is not in any degree due to the Civil Authorities. Probably in no province of this presidency has the Road-fund been administered with so much spirit and energy. But in the hopeless nature of the available material for road-making, the results of this energy are to be seen rather in the abundance and goodness of the bridges, than in the quality of the roads.

12.—From this difficulty in the way of obtaining tolerable roads at any practicable cost arose the idea of making railways, or tramways.

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* Personal enquiry and information, principally from F. Williams, Esq., I have marked in the map in yellow, the places where *kunkur* is known to be found.

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Tramways are much talked of in Indian newspapers, but what these latter mean by them it is difficult to say. Some cheap version of a railway, capable of being traversed by the carts of the country, is probably the vague idea.*

I have given a good deal of consideration to conceivable modes of making such tramways with brick or timber. The remoteness of stone seemed to exclude it from practical consideration. Supposing that, with either of those materials, a tolerable construction could be produced, yet a difficulty meets us at starting. This is the simple and patent fact, that in a native cart the bullock goes exactly in front of the wheel, and has done so since the days of Ram, so that the bullock would have to travel on the tram, as well as the wheel, to the detriment of both tram and bullock. This may seem to some a trivial difficulty, but it involves a change in the immemorial form of native cart, and that I am not sanguine enough to expect yet awhile.

Mr. Williams undertook to try some patterns of tramway for specific localities, such as sandy river beds, where special means might be used to obviate the difficulty. But I have not yet heard from him the result of his experiments.

13.—Considering a good metalled road unattainable for the reason given, and not having been able to suggest any thoroughly practicable middle term between that and a railway, to a railway of some kind, my attention has been constantly turned in this enquiry.

* I have just met with a plausible definition by an ingenious speculator:—"Railways divide into two branches, tramways or *trammel ways*, in which the guiding power is on the rail—and railways proper, in which the guide is on the wheel."—*Mr. W. Bridges Adams, in the Journal of the Society of Arts, May* 11, 1855. This would not, however, apply to the well-known granite tramway on the Blackwall Road, where the only guiding power is the skill of the driver and the good sense of the horse.

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Whether this should be a way for cattle, or for locomotive draft, is a question on which some considerations will be offered further on. The direction of the line would not be affected by its being one rather than the other, and that question should first be settled, as far as present knowledge allows.

14.—The only engineering difficulties in the country are the rivers. These are:—

The great Ganges and its khadir, more or less subject to inundation, which must be got across somehow; the Ramgunga, and the numerous tributaries flowing into the Ramgunga from the north-eastward.

The Ramgunga acts to all these as a catch-water drain, and carries them off into the great Ganges below Futtehgurh. The country between the Ganges and the Ramgunga is comparatively high and dry, and it would simplify matters much, if the road could be confined to the west of the latter river.

But the great towns of Shahjehanpore, Bareilly and Pilleebheet, all lie beyond, as well as the greater part of their productive districts; and a railway, confined to the west bank, would neither serve the required purpose, nor attract the traffic.

15.—It was originally proposed by Mr. Dick that the first section should be carried from Chundousee to the Ganges, with the intention of extending the line eastward across the Ramgunga,—if practicable, to Bareilly and Shahjehanpore. The scheme met with favour among several gentlemen interested in the province. A mart like Chundousee would form an excellent temporary terminus, and the extension would eventually bring in the large cities and productive districts eastward.

16.—What I saw of the Ramgunga at and near Bareilly, led me to doubt the practicability of the scheme of extension. It is broken into several channels, each occasionally carrying the main stream,—all tortuous and shifting in their course through a light sandy soil, and spreading into

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very extensive inundation during the rains. To carry the line anything like direct from Bareilly to Chundousee, miles of this inundated country would have to be traversed; in fact, it would travel along, rather than athwart, the alluvial bed, and the enterprise would almost realize the ancient French Engineer's jest of building a bridge "the long way" of the river, instead of across it.

To avoid this excessive extent of inundation involves considerable circuit. But in any case the spread of the river is so great, and its locality so variable, that I doubt whether any site could be found hereabouts, where the permanency of a bridge could be depended on.

At Bareilly, too, the permanent depth of the river is considerable (8 to 12 feet and more), the rise as much again, and headway for boats has to be provided. So that a bridge here would be a very serious undertaking.

To carry out Mr. Dick's scheme, *without* the extension to Bareilly, would I think fail to meet the requirements of the case. The Ramgunga passage is one of the great obstacles to traffic, which we wish to abolish.

17.—From what Mr. Williams told me at Bareilly, I was induced to hope that, at Moradabad, the Ramgunga would be found much more manageable, and I was not disappointed. The city stands on a high and tolerably firm bank; the channel is single and direct; the inundation more limited and well defined; the river not subject to great variations of course; and the water fordable in the cold season. There is no point I believe below Moradabad, that possesses the same advantages.

18.—This led me first to consider that the true course for a Rohilkund railway would be from Bareilly *viâ* Moradabad, and not *viâ* Chundousee to the Ganges.

It is true that all the water which flows in the Ramgunga at Bareilly, and does not flow in that river at Morada-

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bad, must be crossed in some shape or other. It meets us in the Dojora, the Kosilee, and one or two smaller rivers; but I believe that, under the circumstances, it is better that we should so encounter the drainage in detail, than in the unmanageable mass. This distance is somewhat greater, but this is greatly counter-balanced by bringing into the line two such towns as Rampore and Moradabad.

19.—Chundousee, it is true, is left out. But we have shown that it has no natural advantages. There is no *gold mine* there, as Mr. Batten expressed it. Such inland marts as Chundousee and Hatrass can scarcely by any possibility retain their consequence, when railways begin to change the lines of circulation. Were a railway from Bareilly to run even through Chundousee to the Ganges, Chundousee must decay. Traders would not unload their goods half-way on the journey, because there were expectant bunyas at Chundousee.

20.—It is true that great as is the present traffic towards Delhi, it is even greater towards Hatrass and that quarter. But if we consider that even now the produce from Benares competes with that of Rohilkund in the markets of Hatrass and Agra, it is likely to be a still more formidable competitor, when the East Indian Railway is completed to the vicinity of those markets. In the Delhi circle, and further west, the Rohilkund produce must continue to occupy a stronger position, and any decided improvement in the means of communication would probably enable it not only to keep that market, but to extend its sale in that quarter. We can at present contemplate but one line; that to Delhi seems the safe one.

21.—The terminus of our railway westward must depend upon the arrangements of the East Indian Railway Company in the Upper Doab, on which a decision has not yet been given. But in the hope that Meerut will in one way or other be a station of that railway, we may at present consider Meerut to be one terminus.

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22.—A complete line of railway, extending from Shahjehanpore, would then connect, in a space of 170 miles, the towns of Shahjehanpore (75,000), Bareilly (1,12,000), Rampore (probably 30,000), Moradabad (60,000), Umroha (35,000), Meerut (40,000), and forty miles further Delhi (1,52,000), a string of populous places, such as is rarely indeed to be found in the same compass.

From Shahjehanpore the sugar of that district would be taken up; from Bareilly its own produce, and that of Pilleebheet, now connected with it by a metalled road. The smaller marts of Bareilly, such as Richea, &c., would be tributaries further on; Rampore and Moradabad would cast in the whole of their export trade, and at Umroha and Dhunoura we should pick up the produce of Bijnour.

At present the return trade consists mainly of salt. Of this article the line would probably bring the supply, not for Rohilkund only, but for a great part of Oudh also.

23.—It does not appear to me that anything short of 120 miles from Bareilly to Meerut could be undertaken with advantage as an "experimental line." A short line can only be remunerative in such situations as between a great commercial city and its port, like the experimental line of the world, the Liverpool and Manchester; or between a great city and its suburbs, like the first thirty miles out of Calcutta. From Chundousee to Meerut might have answered, had the eventual extension been practicable; but from Moradabad to Meerut would certainly not answer, as a glance at the map will sufficiently show.

24.—How the passage of our great obstacle, the Ganges and its khadir, is to be treated, and where to be accomplished, is a question that could not be answered, without a much more deliberate and extended examination, and above all without having seen what it is in flood at several selected points. From what I saw, Sherpore ghât seems to have a good deal to recommend it, especially if Meerut be the terminus at which we aim. Can a bridge-of-boats

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be kept open on the Ganges during the rains, or can it not? is a very important question. For if *not*, we must cut out three or four months from our working year, and so cut out one-third or one-fourth of the amount of traffic that we could dispose of with the same establishment and plant. With this also is connected necessarily the question, how far we can with safety embank across the khadir, and restrict the river to its definite bed? I do not look on this as hopeless, especially at Sherpore. But His Honor the Lieutenant-Governor will scarcely expect a positive opinion on the subject in present circumstances. I may observe, however, that Colonel Napier is embanking, or preparing to embank, the khadirs of the great Punjab rivers, including the formidable Chenab, with a view to the maintenance of floating bridges throughout the year.* In any case, however, we must contemplate a break of line at the Ganges, and the transport of the goods from a terminus on one bank to a terminus on the other, by an establishment probably of the character of the existing bullock train, adapted to a plank tramway over the sands.

25.—The country between Bareilly and Moradabad, excepting in the immediate vicinity of the rivers, is not subject to inundation, and would not require much embanking. The rivers to be crossed are as follows:—

1*st.*—The *Jooa*, or *Darunneea*, immediately under Bareilly, and joining the Ramgunga above the Eedgah ghât there. It is crossed by a substantial bridge of seven 20-feet arches, built by the Local Fund. Something more of waterway would be desirable.

2*nd.*—Six or seven miles from Bareilly is the *Sunka*. It is crossed at present by a *pathan* bridge of seven arches, affording 65 or 70 feet waterway. The river was bunded up when I saw it, and it was difficult to judge of its natural condition. But it has evidently dug deep under the

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* *Vide Punjab Selections*, No. VII.

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bridge, and the latter appears to be isolated in floods. A bridge of 200 feet waterway, with embanked approaches, would probably be necessary.

3rd.—The *Dojora*, a principal tributary of the Ramgunga, is formed by the union of the Bukra and Western Bygool. The present road crosses a short distance below the junction. It might be desirable to examine whether it would not be better to cross these rivers successively higher up. Mr. Williams, however, who knows the country well, says that higher up the crossing would be less favorable. Below the junction the river never crowns its right bank, but its floods extend for about 4,000 feet in low land to the eastward.

I do not conceive that anything like this is to be looked on as the waterway of the river. Where the land is low, of course the water will flow in. But the best proof, that it does not flow with force, is the fact that the present road is embanked across the lowest part of the ground, and that the embankment had only been cut through in one place for about 12 feet by last year's rains. The proper channel of the river is very deep, and well defined. The water was stagnant in January, and appeared to be bunded below. The section is shown in Plan VI.* I consider, with present knowledge, that 800 feet waterway would be probably required.

4th.—The *Kosilla*, another tributary of the Ramgunga, flowing near Rampore. It flows in a shallow sandy valley, and appears to wander within the limits of this; but, as far as a judgment could be formed from what was seen and heard, with no great violence. It was easily fordable in the end of January. I think probably a low bridge of 500 feet waterway would suffice. The section is also shown in Plan VI.*

26.—*5th. The Ramgunga.*—I have already spoken of this river as affording, at Moradabad, a more promising crossing point than anywhere else. Two sections are

* Not reprinted.

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shown in Plan V., and their position is indicated in Plan III., Figure 2.* The river appears to be tolerably permanent in its present bed, and probably any tendency to pass to the eastern side of the valley might be prevented, as the flood seems never there to be of any great depth.

The river was fordable in January below the town. The bridge-of-boats was maintained through the latter half of last rainy season, and it is intended to maintain it permanently in future. The greatest rise of the river appears not to exceed 10 feet; and by a level which I ran along its bed for two miles and a half, the slope of the flood channel does not exceed 1·9 foot per mile. There is no navigation, and the bridge could be kept low. From inquiries, and from examinations which Mr. Strachey has kindly had made for me, there appears a probability of finding good soil at no great depth, at least in a part of the bed.

The river has, in the course of years, cut away part of the bank on which the town stands, as is prominently shown by two great wells which now stand up as isolated towers in the bed of the stream, about forty feet from the bank. But the process appears to be slow, and the massive foundations of the old fort and other buildings would form a strong bulwark and defence against further encroachment. I consider that 2,700 feet would be a liberal allowance of waterway.

27.—The country between Moradabad and the Ganges is generally higher, and much drier than any other part of Rohilkund that I have seen. The course which I followed, in order to visit Chundousee, was further south than the line laid down, but I believe the same character applies to the country about Umroha. There is only one river worth naming, *viz.*,

6th.—The *Gangun*, about five miles from Moradabad. It is amply spanned by a bow-and-string-timber bridge, planned by Mr. Dick, with four waterways, of 75 feet each.

* Not reprinted.

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28.—7*th.* In the Ganges khadir are several channels that would require to be bridged, to which I have allowed an aggregate of 800 feet. This is rather a guess however. If Sherpore be the crossing adopted, the most considerable among these would be the *Booreea Gunga*, which is conspicuous in the map as an old channel of the river running apart from the main stream for many miles, immediately under the high bank on the Doab side. It has silted up, and is now a mere marsh, considerably raised above the bed of the Ganges, and, as far as I could learn, does not bring down a great body of water even in the rains. I speak of it at the place where I saw it, which is indicated in the Sketch Plan X.* The section of the khadir here is shown in Plan VIII.,* in juxtaposition with one taken at Gurhmuktesur, Plans VII. and IX.*

8*th.*—Independently of the question of preferable site in an engineering point of view, we can scarcely say what point on the Ganges would be best to aim at, until the alignment of the East Indian Railway and its branches be finally settled. No doubt the most satisfactory arrangement for Rohilkund would be, that a branch of the East Indian Railway should run on to the Ganges, and so enable us to restrict our local scheme to the left bank of that river, and the best method of transporting our traffic across it. But this we can hardly hope for. There then remains the question, whether *in any case* the Rohilkund line should be restricted to the left bank of the river. This would keep working expenses lower, by avoiding the expensive arrangements for crossing and re-loading, and in that case Gurhmuktesur, a permanent seat of some considerable population, connected with Meerut by a pucka road, would be a better terminus than Sherpore. I do not however see, I confess, how we can expect to obtain the traffic of the Rohilkund districts destined for Dehli, unless we are prepared to deliver it at Delhi or thereabouts.

* Not reprinted.

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9*th.*—There are two branches of the eastern Kalee nuddee to be crossed if we go on to Meerut. I have not seen them for many years, and have put them down by guess at 300 feet waterway.

29.—Along the line from Bareilly to the Ganges *kunkur* is attainable, so far as I could learn, only in the immediate vicinity of Bareilly, and near the left bank of the Ganges, in the valley of a rivulet called the Bhugud. In the latter it is said to be plentiful, and to be found in large blocks.

I saw masses of *kunkur* also about the old buildings in the ancient town of Sumbhul, but could not learn whence they had come. Between the Ganges and Meerut I presume that *kunkur* would be available.

30.—It is now time to consider the amount of traffic on which we can calculate. Messrs. Williams, Ricketts, Wingfield and Strachey, have collected a great mass of statistics on this subject, and to their interesting papers I must refer for details. What bears distinctly on the probable traffic of a Railway following the general line indicated I have collected and analyzed in Appendix A. From this it appears that the annual amount of existing traffic which might be expected to be drawn to a railway holding out fair attractions to the community, would be (reduced to a uniform mileage equal to the whole distance from Bareilly to Meerut) maunds 18,10,219, or tons 64,650, of which the exports amount to tons 53,242, and the imports to tons 11,408.

31.—For the mode in which the statistics were obtained, and the value which is to be attached to them, I must refer to the annexed papers themselves. I believe no idea of over-estimate (but rather the reverse) will attach to any, unless it be that of the Bareilly district. Yet no one appears to have gone into the question so thoroughly and completely as the Collector of Bareilly, and no one had experience of the province equal to his; and his own

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opinion is, that his estimate is *under* the mark. In Annexure V. will be found a statement drawn up by Mr. Williams, which shows that the estimated exports bear a very moderate proportion to the probable produce of the whole district.

32.—An important element in the railway question is the cost at which this existing export and import is carried on. Sufficient data for an answer will be found in Appendix B., from which it appears that 1·83 *annas* per ton per mile fairly represents the present cost of transit. Considering the obstructions, this is not so high as might have been anticipated, and leaves the less margin for the establishment of railway rates at once reimbursing to Government, and attractive to the traders.

33.—We now arrive at the important question,—what sort of railway we are to have? *First*, to consider the project of a cattle-draft line.

We have in this country no cattle-draft railway for general traffic, though we have at Roorkee, and also, I believe, at the great Godavery works, light railways in operation for special constructive purposes. There is, or was also, the Redhill railway at Madras, established for the purpose of bringing road metal into the city; but I find no account of it accessible to me at present.

Such railways English books now utterly ignore. The idea of railway, for general traffic, had scarcely begun to be taken in by the public mind in England, when the superadded invention of the locomotive engine took entire possession of the field. Yet horse railways are still worked, I believe successfully, in Germany; and in America they were, at the commencement of the railway system, numerous. The American edition of "Wood's Railways" contains an account of many such.

If they can be worked with profit at all, the advantages they hold out in the power of working with so much lighter material and less costly establishment in this country,

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where so much costly material and costly management has to be imported for the working of a locomotive system, must strongly recommend them where there is a considerable, but not unlimited traffic to be expected.

I doubt if an Indian Engineer Officer in Europe, on furlough and with his time at command, could devote a part of it to a better purpose than a thorough examination of such railways, wherever they are to be found.

34.—Colonel Cotton has started the idea, and to his perfervid genius the credit will be due, if the system gets a trial and succeeds. But one will look in vain to his papers for any useful hints in the practical working out of his idea. The more details are considered, the further we get from the low standard of his estimates.

In contemplation of so considerable a traffic as that of Rohilkund in its main line, I believe it would be useless to propose a work of a slight or makeshift character. Referring to the Roorkee railway, with which the Lieutenant-Governor is acquainted, I think we require a more substantial structure than the best parts of it.

35.—In the comparison between animal and locomotive power for the project, gradients will not enter much into question, excepting at some of the bridges, and the earthwork will form so small a proportion, probably, of cost, that little can be saved on it by preferring the former. Steeper gradients may be admitted, if necessary, on the cattle railway, not because cattle are at all less sensible to the tendencies of gravitation than locomotive engines, but because the remedy of additional power can be more cheaply applied, where wanted.

In such a railway as we now propose, there would be no object that I can see in keeping the gauge of the East Indian Railway. We make the railway for cattle draft, and adapt it to that. Neither the way nor the establishment will be prepared for locomotives, and it may be as well to make it impossible for the locomotives, at least

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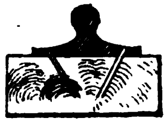
of the East Indian Railway, to come upon the line. We *must* have a break of line, where we meet the East Indian Railway, and it may as well be a break of gauge.

The narrower gauge enables us to make some reduction in the cost of works and way, and a larger reduction in the cost of waggons. I therefore propose that the gauge should not exceed 4′ 6″. The rail intended to be used is the flat-soled American pattern, used on the Croydon, the Birmingham and Gloucester, and many German lines, giving it a weight of 30lbs. to the yard.



36. Some remarks upon the rates used in estimating will be found in Appendix C., and in Appendix D. an estimate of the cost of bridging, which forms such an important item on the projected line. This estimate has been drawn out with a good deal of consideration on the general plans of bridges, of two or three different kinds, given in Plan XI.*

Estimate for one mile of Cattle-draft Railway for a main line in Rohilkund.

Earthwork, averaging 4 feet high, and 10 feet wide at top, slopes 3 to 1, cubic feet 4,64,640, at 2 rupees, ...	Rs.	929
Sand ballast, 1 foot thick, cubic feet 36,960, at 1 rupee per 100, ...	„	370
Brick, or natural ballast, ½ foot thick, cubic feet 18,480, at 6 rupees, ...	„	1,109
Longitudinal timbers, 8″×4″, 10,560 running feet, or cubic feet 2,347, at 1 rupee, ...	„	2,347
Cross-ties, 883 in number, or cubic feet 978, at 1 rupee, ...	„	978
Spikes, 4,000lbs., at 3 annas, ...	„	750

* Not reprinted.

Laying way, per yard, 1 rupee, ...	Rs.	1,760
Rails, 30lbs. to the yard, 48 tons, at rupees 160, ...	Rs.	7,680
	Rs.	15,923
Add :—		
For Sidings, $\frac{1}{10}$th, ...	Rs.	1,592
For Culverts and small Bridges, Brickwork, 6,000 cubic feet, at rupees 16, ...	„	960
For large Bridges,—see Appendix D., ...	„	3,893
For Station Buildings, ...	„	800
Fencing and Gates, ...	„	800
Plant and Waggons, ...	„	2,532
TOTAL Rupees per mile, ...	„	26,500

37.—Now as to working expenses. I could not obtain, from the railway at Roorkee, any data which seemed to me very applicable to the project before us. The work and circumstances of that railway are too peculiar, and too much mixed up with other matters, to give good railway data, except as applicable to the special business of earthwork and the like, for which I believe its results have been most satisfactory.* The cost, of haulage only, not including waggons even, is stated in an abstract of some of the results by Mr. Martin, of the Canal Office, at 5½ pie per ton per mile. This is derived from average of transport on earth-waggons for distances under two miles, and is quite inapplicable to a long traffic.

38.—We have however in this country an establishment somewhat analogous to that of a good railway, in the Gov-

* Exclusive of charges for railway and waggon construction; but including traction, earthwork on the Solani aqueduct, dug, carried one mile, and thrown into bank, costs 3¼ rupees per 1,000, or less by 8 annas than contractors on the East Indian Railway are receiving for earthwork done in trenches alongside the bank.

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ernment Bullock Train. On a suggestion, for which I have to thank my brother officer, Major Oldfield, I sought data for the working expenses from the Superintendent at Allygurh. These data, which had to be prepared by the extraction of an immense number of small items, were lately furnished to me by Dr. Clark, and the substance of them, with some deductions of general interest, will be found in Appendix E. From these it appears that the cost of transport by the Train averages little under 1 anna per ton per mile. Now this is rather encouraging than otherwise. For, as a horse can draw at least eight times as much gross weight on a level railway as it can on a level turnpike road, we might divide one anna by eight, and call that the amount of working expenses per ton per mile.

It is however to be remembered that the Bullock Train establishment is in happy ignorance of the expenses of road maintenance, which are charged to another department. Neither is it self-dependent in the matter of establishment, which for the most part is identical with that of the Post Office. A part is charged to the Train, but of course this is less than if the transport system stood alone. And, not to go into other sources of enhanced expense, the cost of "rolling-stock" adapted to a railway will be in a heavier ratio than in the case of the Bullock Train.

39.—The great difficulty that I foresee on a cattle railway will be that of keeping our rolling-stock within reasonable limits. Draft horses, for a purpose such as our's, can scarcely be said to exist in India, and we must therefore look to oxen for our draft. Oxen move slowly, and we must consequently keep up a larger establishment of waggons. Such speed as we expect to gain over that of the present country transport will be rather by the advantage of relays and constant movement, than by any great acceleration of rate whilst in motion.

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40.—Let each waggon be supposed to carry two tons. For 30,000 tons to be moved at once, we should require ... 15,000 waggons.

These waggons, travelling day and night, we may suppose to accomplish the journey of 120 miles in 3 days, and to return in the same, halting on Sundays. We may therefore count on the same waggons starting from Bareilly once a week, or making 43 trips in 300 days. We require, then, to keep up this traffic, ... 350 waggons.

Or allowing 150 spare, as our establishment, ... 500 waggons.

The cost of these is supposed to be included in our mileage estimate of construction. But the carts may be expected to require renewal at least every five years. Supposing the cost of a waggon to be 500 Rs. (which I fear is too low) then $\frac{500}{5} \times 500$, ... Rs. 50,000 for cart repairs. *(a)*

Next for Cattle.

41.—The Bullock Train establishment obtains them at a contract rate of 12 rupees per pair per month. But I fear that our large concentrated demand would scarcely obtain cattle at so low a rate. Let us say half a rupee per diem for the pair.

Allowing two waggons, or four tons nett to a pair of bullocks, (and 12 miles a stage, the practice of the Bullock Train,) to carry at once our load of 30,000 tons would require 7,500 $\times \frac{120}{12}$ ... (Rs. 75,000)—pairs of bullocks.
Or, divided over 300 days, („ 250)—pairs.

We may find, however, that we have to pay such a rate as will cover the hire, or keep of the cattle for the whole year, or 365 days, instead of 300; hence 250 $\times \frac{1}{2}$ R. $\times$ 365, Rs. 45,625 for the cost of cattle. (*b*).

42.—Establishment it is more difficult to estimate. But as one reason in favour of a cattle (rather than a steam) railway is the expectation of preserving a moderate scale of establishment, probably something like this would suffice:—

Superintendence of works and traffic, ...	Rs.	1,500
Two terminal stations,	„	700
Ten minor stations,	„	1,500
Monthly, ...	Rs.	3,700

Or annually, ... Rs. 44,400 for establishment (*c*).

Maintenance of way. With the slow movement of a cattle line this ought not to be heavy, say Rs. 150 per mile, ... 150×120=Rs. 18,000 for maintenance (*d*).

The account will stand thus:—

Repairs of rolling-stock, &c.,	Rs.	50,000
Hire of cattle, --- ...	„	45,625
Establishment, --- ...	„	44,400
Maintenance of way, ...	„	18,000
TOTAL, ...	Rs.	1,58,025
Or per mile, ...	„	1,317

The cost of carrying 1 ton a mile will be

$$\frac{\text{Rs. } 1,58,025}{30,000 \times 120} \quad \ldots \quad 0{\cdot}702 \text{ annas.}$$

43.—As the professed object of this scheme is to carry the produce of Rohilkund into the western markets, at a rate which will protect it against supercession there by the produce of Benares transmitted on the East Indian Railway, we must desire to keep the tariff of transport as low as possible.

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The average current rate of transport, we have seen, is about one rupee eight annas per ton per mile. To give a decided benefit to the Rohilkund producer in cost as well as speed of carriage, and in fact to insure to the scheme that ample share of the traffic which it requires for success, we ought not, I imagine, to charge more than 1¼ anna if possible. I will, however, calculate the results both at 1¼ anna and 1½ anna, which is nearly the rate of the East Indian Railway's tariff*.

44.—The gross receipts, then, on tons 30,000 would be per mile:—

At 1½ anna, ...	Rs.	2,813
Or @ 1¼ anna, ...	„	2,344
And the expenses being as above, ...	„	1,317
The net revenue per mile will be, ...	„	1,496

Equal to 5·64 per cent. on construction, or Rs. 1,027, equal to 3·9 per cent.

It is to be recollected, however, that the obstacle of the Ganges has to be considered in our estimates. If it be found impossible to maintain a bridge over the Ganges during the rise in the river, it must very seriously affect the calculations for both locomotive and cattle railway, though rendering the need for one or other all the more stringent, for such a state of things, by limiting the number of working days and consequently swelling the charge for dead stock and cattle-hire, must considerably raise the working expenses. If such a bridge can be maintained, though there will still be a break in the line, it will be a comparatively trifling aggravation of working expenses. Probably an extra allowance of eight

* Two-thirds of a pie per mile=nearly 1 anna 7 pie per ton. In the event of success, it is hoped that our tariff might be decidedly reduced. Three-quarters of an anna are what I should wish to be the *maximum*.

annas per ton would cover the additional expenses. If, however, we say 12 annas per ton, this would leave the net receipts per mile—

At 1½ anna, Rs. 1,309, or 4·94 per cent.

At 1¼ anna, Rs. 840, or 3·17 per cent.

45.—We may take a different view of the working expenses. The bullock train is worked, as we have seen, including a part of establishment, and the whole of the hire of cattle and repairs of carts, at less than one anna per ton per mile. Leaving out the proportion of establishment, this becomes ·796 annas per ton per mile for carts and cattle.

We take *four* times the load with the same power. Let us assume that we can do the haulage at *one-half* the cost, ·398 annas per ton per mile. This will give the whole cost per mile of railway for haulage, ... Rs. 746

The cost of establishment and maintenance, by our former estimate, amounted to Rs. 62,400, or per mile, ... „ 520

TOTAL COST PER MILE, ... Rs. 1,266

Leaving—

At 1½ anna, Rs. 1,547, or 5·83 per cent.

At 1¼ anna, Rs. 1,078, or 4·06 per cent.

46.—We now come to the consideration of that which all interested in Rohilkund would desire to see, if it be attainable, viz., a railway adapted to light locomotive power.

The gauge estimated for is that of the East Indian Railway, viz., 5′ 6″. We should never wish to see their heavy engines on our line; but if we have a common terminus at Meerut or elsewhere, it would be well to preserve the power of running our waggons or engines upon their line if necessary. The rail supposed to be adopted is of the same character as in the estimate for a cattle railway, but weighing 50 lbs. to the yard.

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47.—Estimate for one mile of locomotive-power railway for a main line in Rohilkund:—

Estimate.

Earth-work, bank 5 feet in average height, and 15′ wide at top, slopes 3 to 1, cubic feet 7,92,000, at 2 rupees per 1,000, ...	Rs.	1,584
Sand ballast, cubic feet 52,800, at 1 rupee per 100, ...	„	528
Brick or natural ballast, cubic feet 39,600, at 6 rupees per 100, ...	„	2,376
	Rs.	4,488

Longitudinal sleepers, 10″ × 5″, 10,560 running feet, or cubic feet 3,667, at 1 rupee, ...	Rs.	3,667
Cross-ties, 8″ × 4″ × 5′, 880, or cubic feet 978, at 1 rupee, ...	„	978
Spikes, 6,000 lbs., at 3 annas, ...	„	1,125
Laying way, at rupee 1-4 per yard, ...	„	2,200
Rails, 50 lbs. to the yard, 80 tons, at 160 rupees, ...	„	12,800
	Rs.	25,258

Add—

Sidings $\frac{1}{10}$th, ...	Rs.	2,526
Culverts and small bridges, cubic feet 10,000, brickwork at 16 rupees, ...	„	1,600
Station buildings and shops, ...	„	2,000
Large bridges, (see Estimate D., Appendix,) ...	„	4,802
Fencing and gates,...	„	1,500
Workshop tools, turn-tables, switches, watering apparatus, &c., ...	„	1,314
Rolling stock,...	„	4,500
TOTAL, PER MILE,	Rs.	43,500

48.—We now reach the difficult question of working expenses. Little can be yet learned from the experience of the two Indian railways, the traffic of both being mainly in passengers, and the accounts of the East Indian Railway not yet being available in a shape to furnish any useful information as to working expenses. All the accessible data are derived from railways in which passenger traffic is a very large, if not by far the largest, source of profit, and it is hard to say how far these data are applicable to a purely goods line, and that worked in a remote part of India. Synthetically to estimate the working expenses of such a line with any accuracy is probably not in the power of any man. Even to attempt it is not at present in mine. But I will bring forward the available data which seem most in point.

49.—The statistics of the Belgian railway system have been very elaborately analysed by M. Belpaire, and Dr. Lardner gives many of the results in his book on railway economy.

By Lardner (page 257) we find that the total cost of transporting a ton of goods a mile amounts to 1·11*d.*, or ·717 annas. Say that we have 60,000 tons of goods to carry over the whole line, the gross receipts per mile would be—

At 1½ anna, ... Rs. 2,963
At 1¼ anna, ... „ 4,687

And the cost of transport ·717 annas × 60,000 = Rs. 2,689. Hence the nett receipts would be per mile—

At 1½ anna, Rs. 2,936; or, on the cost of construction, ... 6·75 per cent.
At 1¼ anna, Rs. 1,998, or ... ... 4·6 per cent.

50.—We also find (page 264) that the average cost chargeable to each vehicle of a goods train was 2·56*d.* per mile travelled, equal to 1·706 annas.

Our total traffic is 60,000 tons, of which we may estimate one-fifth as import or return traffic. There remain 48,000 tons, occupying 12,000 waggons which go and come, or 24,000 waggons in all. 24,000 × 1,706 annas = Rs. 2,559,

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the cost of transport per mile, which would give a slightly better result than the last calculation, *viz.* :—

12 Engines, of 14 tons weight, and 11 inches cylinder, ...	Rs. 3,00,000
200 Waggons, carrying 4 tons each, on springs, &c., ...	„ 2,00,000
TOTAL, ...	Rs. 5,00,000

Equal to Rupees 1,646 per mile.

51.—Again, the receipts per mile run by goods trains on the Belgian railways appear to have been, in 1844, Rs. 2·58
in 1847, „ 1·82
and average on four years, from 1844 to 1847, ... „ 2·11

Now, we have to carry 48,000 tons one way in 300 days, or 160 tons a day. This with full loads would require two trains running each way, daily—120 miles. The annual mileage would be—

$$2 \times 2 \times 120 \times 300 = 1,44,000,$$

And the annual receipts as above.

At 1½ anna, Rs. $5,625 \times 120$. At 1¼ anna, Rs. $4,687 + 120$.
Hence the receipts on each engine per mile of running would be—

$$\frac{5,625 \times 120.}{4 \times 120 \times 300.} \qquad \text{Or } \frac{4,687 \times 120.}{4 \times 120 \times 300.}$$

And the receipts per mile run—

At 1½ anna, Rs. 4·687. At 1¼ anna, Rs. 3·9.

All these three modes of calculation hold out a promise of favorable results.

52.—Abatements, however, must be made from these results.

1st,—Because it would be some time before the railway obtained 60,000 tons of traffic. Doubtless, however, in time it would obtain much more.

2nd,—Because of the Ganges interruption.

3rd,—Because in the above calculations we have considered every train to be filled. The great aim of good

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management will be to start every train as nearly of full size as possible; but of course, or at least probably, the average will be considerably below this.

53.—Besides entering into these calculations, which some may consider to be rather over-refined, I have consulted Mr. Roche, the Traffic Manager of the East Indian Railway, who previously held the same office under the Great Indian Peninsular Company at Bombay from their start, besides having had much European experience. Mr. Roche considers that, with such engines and rails as we have estimated for, trains of 80 tons nett ought to be taken eight or ten miles an hour, and that the expenses, including everything but repairs of way, should not, and would not, exceed 10 annas to 12 annas per mile run, using wood-fuel, as we of course must do in Rohilkund. We shall, however, take it at one rupee. The cost at Bombay, by the accounts from June to December of last year, averaged a fraction over one rupee per mile for fast trains; the annual mileage with full trains we found to be above 1,44,000. Allowing for engines, piloting, shunting, &c., and for unfilled trains, let the mileage be called 2,00,000.

54.—Maintenance of way with the slow pace we propose to render imperative should not be heavy. But let us call it Rs. 500 per mile. The estimate will then stand thus—

Haulage, including management, maintenance of machines, labour, and material, say 2,00,000 miles at one rupee, ...	Rs. 2,00,000
Maintenance of works and way, 120 miles, at Rs. 500, ...	„ 60,000
Total cost annually, ...	Rs. 2,60,000
or per mile, ...	„ 2,166

which would leave for nett receipts per mile—

At 1½ anna, Rs. 3,459, or nearly 8 per cent.

At 1¼ anna, Rs. 2,521, or 5·8 per cent.

55.—From all that has been brought forward, it appears that either a cattle-draft railway or a locomotive-power

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railway would pay respectable interest at least on the outlay. The former has the advantage of coming forward with a smaller demand for money at starting, and of requiring less expensive superintendence, &c.; but it is evident that its capabilities must reach their limit, probably even before it takes up anything like the whole existing traffic on the line, and with a large traffic the quantity of apparatus to work at so slow a pace would be somewhat unwieldy. Still the railway so made would, as it appears probable, pay interest on the outlay, and would be highly beneficial to the country.

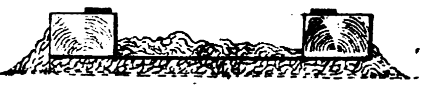
Of the advantage that might be looked for from the locomotive line it is needless to speak.

56.—In none of the preceding calculations have I estimated any passenger traffic. Even with the lighter railway, we ought to have horsed passenger carriages, going eight or nine miles an hour, and even with these the traffic I believe would become considerable. With the locomotive line, intercourse between the large cities, which are so numerous along it, would doubtless develop a large passenger traffic.

57.—A few words remain to be said on the traffic of the Bijnour district, which is only skirted by the projected line. The trade is given satistically by Mr. Wingfield at 3,01,000 maunds; but he considers that 6,00,000 would represent it more fairly, so much being carried to the Moradabad marts by the agriculturists themselves, of which he could obtain no definite statement.

For a traffic of this moderate description, I conceive that a railway of the cheap American or (flat-bar) kind would be most suitable.

58.—Estimate of one mile of flat-bar branch railway, 4½ feet gauge.



Estimate.

Earthwork,	...	...	...	Rs.	500
Ballast (brick,)	...	...	...	„	950

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Longitudinals, ...	Rs.	2,347
Cross-ties, ...	„	489
Spikes, ...	„	562
Laying way, ...	„	1,320
Bar iron, 15 lbs. to the yard, ...	„	3,840
	Rs.	10,008
Add—		
Siding, $\frac{1}{20}$th, ...	Rs.	500
Culverts and Stations, ...	„	1,000
Plant, Switches, &c., ...	„	1,500
Total, for 1 mile, ...	Rs.	13,008

I find that Major A. G. Goodwyn deduced the cost of the Roorkee Rail of this kind to be Rs. 8,810 per mile. As his calculation did not include anything besides the actual iron, timbers and laying, it appears to confirm the approximate truth of the present estimate.

This branch might be made to Nugeena in the first instance, probably from Dhunoura, and, if successful, might be extended to Nujeebabad. There are only two bridges, I believe, required, and those of little moment.

59. Supposing that we could count on 8,000 tons, averaged over the whole distance of about 30 miles, the proceeds, at one and a half anna per ton, would be Rs. 750 per mile.

The expenses, taking the same ratio as in our last estimate, viz. 0·702 annas per mile, would be for 8,000 tons, Rs. 351, leaving net receipts, Rs. 399, or 3 per cent. Any decided fall in the high price of iron would of course greatly favour all the calculations.

It may be said, why not adopt this cheaper and simpler apparatus for the main line from Bareilly. I can only

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repeat my conviction, that with the traffic which we hope and expect on that line, such a rail as this would be rapidly disorganized, and replaced by something more expensive.

60. It may be expected that I should say something regarding the communication from the Bareilly and Shahjehanpore districts to Furruckabad,—the course of a considerable traffic, and one likely to increase greatly. Mr. Williams has recommended that a rail should be made, permeating the whole province, from the Ganges at Furruckabad, to the Ganges at Gurhmuktesur. This is too large a project probably to have any chance of entertainment, though I trust it will be completed one day, as well as a branch from Shahjehanpore to Lucknow, and so to Cawnpore. But these extensions rest on somewhat of a different footing from the line that has been proposed in this report.* They rather might be considered as branches of the East India Railway system; and it is justly said, "Why perplex the Government with projects for branches, when every effort should now be directed to completing the trunk?" But the project contained in this report is not for *any branch*, properly so called, to the East India Railway, *i. e.*, for a tributary line to assist in swelling the great artery; it is intended as a remedy against the mischief, which the great line is expected to cause to a great and productive province. And the remedy may be deferred

* Some early measure of improvement, however, is required in the communication from Rohilkund to Furruckabad. The route is much perplexed by the coalescing floods of the Ganges and Ramgunga, and on this a cursory visit like mine does not give any right to speak. It must be the subject of special examination and survey, and may be respectfully commended to the Lieutenant-Governor as a subject for the next budget. Mr. Williams's suggestion, that the road should be carried straight from near Allygunj (after crossing the Ramgunga from Furruckabad) to Shahjehanpore, is worthy of attention. This would pass through a part of the Oude Territory. From what I heard, there is some reason to believe that, besides shortening the line, it would find metal more accessible.

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too long, for trade having once changed its channel, it may be difficult to bring it back again.

61. I trust it may not be presumptuous to venture on a word as to the mode of execution, if any modification of the projects herein discussed should meet with approval. The execution of railway schemes in India, by guaranteed companies in England, I am far from presuming to impugn, though not entirely appreciating its advantages. At least it has its evils. It often leads to grievous delays; and I know also that no man can serve two masters, and that the divided allegiance, which the system necessarily engenders, renders almost impossible in the executive that loyality and zeal for the interests of its employers, which is honestly believed to have been *in the main*, the best characteristic of the corps of Engineers. I am not so unwise as to suppose that any large proportion of the Indian Railway system *could* be carried out by that corps; there is neither the strength, nor at present the practical knowledge. But many years of railway extension and (when indigenous iron shall be manufactured) rapid railway development are probably before British India; and it is surely to be deprecated that the corps should fall professionally behind the age, as they must, if excluded from that knowledge of this most important branch of engineering, which responsible practice alone can give.

62. Such a moderate scheme as this would afford an excellent school. Suppose an officer with assistants to be appointed to work out the details, and lay down the line, to organize the preparation of material and the establishment of workshops. When his timber contracts should be concluded, and all his kilns alight, send him to England to make his own arrangements (of course in communication with the Hon'ble Court) for rails and iron-work, for engines, and such practical assistants as may be necessary. He will know or soon find out what he wants, better than any one else, and will care a great deal more. And it is pretty certain that he wont bring

out his mechanics in the month of May, or provide 15-feet turn-tables for 16-feet engines. It was at one time the writer's ambition to be permitted to undertake this project; but this circumstances now forbid his looking to, and being able to make these observations without *arrière pensée*, he ventures on them here.

63. It is now time to conclude this long (and I am sorry to say this long-delayed) Report. I had certainly been hopeful of being able to propose a scheme at less cost in capital, and I have been distressed to find the sources of expense to swell with every fresh consideration of the subject. As to the results, with absolute command over the selection of the arithmetical factors, it is of course easy to produce any given *dividend.* But I have at least *tried* to avoid arithmetical *legerdemain* and to let the various calculations work themselves out in an impassive manner, as if Mr. Babbage's machine had worked them. And I think the deductions give reasonable ground to expect that either a substantial railway for cattle draft, or a locomotive railway under strict management, dispensing with needless speed, and with all expenditure that has not real economy for its object, would at an early period bring in a moderate revenue, growing gradually with the stimulus to production, and the development of passenger traffic into a full return, or more, for the capital expended.

64. It was not, however, as a pecuniary speculation that the scheme was started, but as the means of saving from decay, and elevating, one of the noblest provinces of the empire. The exposition of that subject will however be in more capable hands than mine.

65. Whether or not any details that have been suggested here will be found practically useful I do not know, but at least it must be useful to have reduced a scheme, which before was vague, into a tangible form. It can now be laid hold of, to be moulded into better shape, or to be thrust out of doors.

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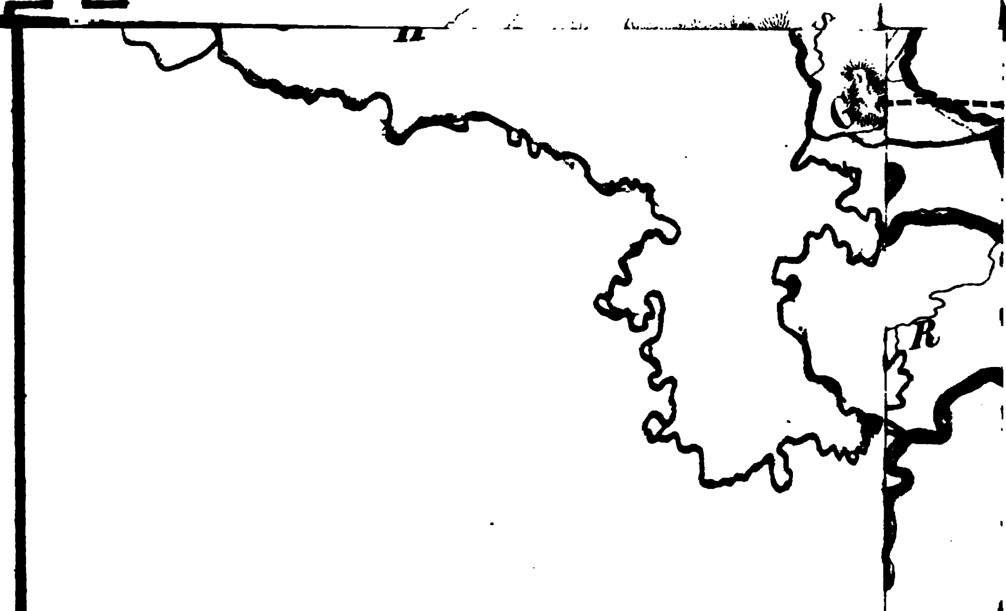
Plate II



(Signed) H. YULE, Cap

Dep^y. Consulting Engineer

19th. July, 1855.

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P. S.—As I close this report, I see in a report of a discussion at the Society of Arts, initiated by Colonel Cotton, that he speaks very highly of patterns of light rail, manufactured by Crosskil, of Beverley. I have written to procure particulars of these rails, which may be useful.

APPENDIX A.

Estimate of the amount of existing Traffic, which may be expected to be taken up by a Railway constructed from Bareilly, viâ *Moradabad to Meerut. As derived from Returns by the Collectors of Districts (annexed).*

EXPORTS.

		Maunds.		
Bareilly marts to Meerut,	... ...	126,064		
Ditto	„ Rewaree, ...	145,928		
Ditto	„ Beree, Bhewanee and Rohtuk,	161,140		
Ditto	„ Meerut and the Upper Doab,...	47,272		
Ditto	„ Palwul, Jhujur, Noh and Alwur,	7,485		
Ditto	„ Rajgurh, ...	6,087		
Ditto	„ Putteala, ...	2,812		
Ditto	„ Chundowsee, and thence westward, ...	372,728		
		———	(A.)	8,69,466
Ditto	„ Kosee and Koel, by Ramghat, ...		(B.)	1,10,823
Ditto	„ Bhurtpoor, Agra, Muttra, Hatras, and the Doab, by Kuchlaghât, ...		(C.)	13,09,059

From Shahjehanpoor.

The points to which exports westward are made have not been discriminated. The whole export westward is	(D.)	2,05,000

From Bijnour.

Produce from the Bijnour marts, which crosses the Ganges direct, ...	(E.)	1,53,000
Ditto which goes to other Rohilkund marts, especially Dhunoura, ...	(F.)	1,48,000

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From Moradabad.

Rice from Moradabad city, the produce of Badlee-Tanda and Rampoor, ...	(G.)	2,00,000
Ditto from Chundowsee to Delhi and Bhewanee, ...	(H.)	47,000
Khand, from ditto, ...	(I.)	48,000
Lal Shukkur, from ditto, ...	(J.)	32,000
Goor, ...	(K.)	60,000
Produce from Dhunoura, ...	(L.)	2,04,000

IMPORTS.

To Bareilly, from the westward, ...		54,470
To ditto, Salt and Cotton from south-west, which the railway would probably supply from Delhi and the Canal districts, ...		20,368
		74,838

To Shahjehanpore.

Total imports from the westward, ...	(N.)	2,57,200

To Bijnour.

Salt and Iron imported, ...	(O.)	70,000

To Moradabad.

To Moradabad city, Salt and Cotton, ...	Rs.	1,41,000
To Chundowsee, Salt, ...	"	92,200
To Dhunoura, Salt and Cotton, ...	"	34,000
	(P.) Rs. ...	2,67,200

Analytical distribution of the above, of Traffic, with reference to the Railway.

(*A.*)—All the component items may be assigned to the railway, except a portion of the exports to Chundowsee, of which a considerable part goes eventually towards Hatras and Agra. I therefore deduct one-third of this

A=8,69,466

$$\frac{3,72,728}{3} = 1,24,242$$

(*a.*) Rs. 7,46,224

(*B.*)—We may calculate that one-half at least of this amount would be transferred to the Delhi direction, if a railway were made to that quarter, ... (*b.*) " 55,421

(*C.*)—We may calculate that one-fourth of this would be transferred to the Delhi line, ... (*c.*) " 3,27,264

(*D.*)—Of this amount a large part goes already towards Delhi. That which would go by rail we may safely estimate at one-half. The estimate of traffic in this district appears very low, ... (*d.*) „ 1,02,500

(*E.*)—Nearly the whole probably goes to the Delhi circle. But a great deal from the northern parts of the zillah would probably continue to go directly across the Ganges. The produce from Huldour, Dhampoor and Nugeena, would probably seek the rail amounting to, ... (*e.*) „ 95,000

(*F.*)—This amount may be entirely set down to the rail, (*f.*) „ 1,48,000

(*G.*)—And this, ... (*g.*) „ 2,00,000

(*H.*)—All the rice that comes from Bareilly and Pilleebheet must be supposed to be already taken account of. One-third remains, the produce of Rampoor, &c., (*h.*) Rs. 15,666

(*I.*)—Of the Khand, one-ninth is to be deducted as the produce of Bareilly and Pilleebheet, ... (*i.*) „ 42,677

(*J.*)—The Lal Shukkur appears to be Bijnour produce, and is probably accounted for under F.,... ... „ 17,32,733

(*K.*)—Of this one-eighth is to be deducted as the produce of Bareilly, ... (*j.*) „ 52,500

(*L.*)—The whole might probably join the rail; but under *f.* we have already accounted for 1,48,000, whilst under *j.* we have omitted 32,000.

Hence *L.*—(*f.*—*J.*)=2,04,000—1,48,000+32,000= ... (*k.*) „ 88,000

TOTAL EXPORTS, ... Rs. 18,72,233

(*M.*)—The whole amount may be set down to the rail, (*l.*) Rs. 74,833

(*N.*)—From this we must deduct the import of Gwalior iron, which must continue to come to Shahjehanpoor, viâ Furuckabad, and take half the remainder, ... (*m*) „ 93,600

(*O.*)—The whole of this may be set down to the rail, (*n.*) „ 70,000

(*P.*)—And of this,... ... ... (*o.*) „ 2,67,200

TOTAL IMPORTS, ... Rs. 5,05,633

The following would travel the whole length of the Railway line, Bareilly to Meerut, 120 miles :—

a.—7,46,224
b.— 55,412
c.—3,27,264
d.—1,02,500
———— 12,31,400 *Exports.*

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Also *l.*— 74,833
m.— 93,600

———— 1,68,433 *Imports.*

The following would travel from Dhunoura to Meerut, 35 miles.

e — 95,000
f.—1,48,000
k.— 88,000

———— 3,31,000 *Exports.*

Also *n.*— 70,000
Part of *o.*— 34,000

———— 1,04,000 *Imports.*

The following might travel from Umroha, or thereabouts, say 50 miles :—

h.— 15,666
i.— 42,667
j.— 52,500

———— 1,10,833 *Exports.*

Also part of *o.*— 92,200

———— 92,200 *Imports.*

The following would travel from Moradabad to Meerut, or 70 miles :—

g.———— 2,00,000 *Exports.*

Part of *o.*———— 1,41,000 *Imports.*

GENERAL RESULT.

Exports as above, carried the whole distance of 120 miles, ...	12,31,400 Maunds.
Ditto carried 35 miles, maunds 3,31,000, equivalent to an amount carried the whole, way of	96,540 „
Ditto carried 50 miles, maunds 1,10,833, equivalent to	46,180 „
Ditto carried 70 miles, maunds 2,00,000, equivalent to	1,16,666 „
Total Exports, carried 120 miles, ...	14,90,786 Maunds.
Imports as above, carried the whole distance, ...	1,68,433 Maunds.
Ditto carried 35 miles, maunds 1,04,000, equivalent to an amount carried the whole way, of...	30,333 „
Ditto carried 50 miles, maunds 92,200, equivalent to	38,417 „
Ditto carried 70 miles, maunds 1,41,000, equivalent to	82,250 „
Total Imports, carried 120 miles, ...	3,19,433 Maunds.

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Total Exports and Imports, carried 120 miles, ... 18,10,219 Maunds.
Or at 28 maunds to the ton :—

Exports, ... Tons	53,242	
Imports, ... „	11,408	
		64,650 Tons.

APPENDIX B.

AVERAGE PRESENT RATE OF CARRIAGE.

Mr. Williams has furnished an elaborate Table of Rates of Carriage from every mart in his district to every ordinary terminus of export. Some errors in copying, render a considerable part of its meaning doubtful to me, but enough remains for every useful purpose.

Other data are furnished by Mr. Wingfield from Bijnour; and a good many I collected on the road by catechising the carters.

Present rates of Carriage.

As furnished by Mr. Williams of Bareilly.

	Per Maund.	Distance. Miles.	Rate per ton, per mile. Annas.
From Bareilly to Delhi, ...	10 As.	155	1·8
„ Rewaree, ...	14 „	205	1·9
„ Meerut, ...	10 „	120	2·33
„ Kosee, ...	9 „	135	1·86
„ Koel, ...	7 „	100	1·96
„ Bhurtpoor, ...	10 „	160	1·75
„ Muttra, ...	8 „	136	1·65
„ Hatras, ...	6 „	110	1·53
„ Gwalior,... ...	12 „	190	1·8
„ Mynpoorie, ...	6 „	94	1·8
„ Budaon,... ...	2 „	30	1·8
As furnished by Mr. Wingfield of Bijnour.			
Huldour, &c. to Bhewanee, Or Rewaree ...	8 As.	145	about 1·54
„ to Delhi, ...	5 „	82	1·70
„ to Hatras, ...	6 „	140	1·2
„ to Kosee, ...	8 „	145	1·54
By Personal Inquiry.			
Shahjehanpore to Bhewanee, ...	13 to 16 As.	250	1·7
„ to Chundousee,...	$10\frac{2}{3}$ „	85	3·5 { Cotton Exceptional.

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Bareilly to Furruckabad, ...	5⅓ „	100	1·49
„ to Rohtuk, ...	9 „	200	1 25
Pilleebheet to Delhi, ...	16 „	185	2·4
„ to Bhagput, ...	10 „	175	1·6
Richeea to Moradabad, ...	2⅓ „	52	1·25
Seesgurh to Hapur, ...	10 „	100	2·8
Budlee-Tanda to Delhi, ...	12 „	110	3·05
Chundousee, to 8 coss beyond Goorgaon,	8 As.	125	1·8
	down to		
	5½ As.		1·23
			Rate per Mile.
Pilleebheet to Rewaree, ...	16 As.	235	1·9
Dhunoura to Khorja, ...	4 „	60	1·86
Pilleebheet to Goorgaon, ...	9 „	205	1·23

The mean of all the above rates is 1·83 annas per ton per mile.

Some of the maundage is doubtless given in local weights, heavier than the Government weight ;—a point which it was often difficult to ascertain. On the other hand some of the rates do, and some do not, include ferry charges, watching, &c. ; so that probably the result attained is substantially correct; viz., that the present cost of carriage into and out of Rohilkund, is between 1¾ and 2 annas per ton per mile.

APPENDIX C.

The following rates were given me by Captain Maxwell, late Executive Officer in Rohilkund, as applicable to a line from Shahjehanpore, *viâ* Bareilly and Moradabad, to the Ganges.

Pukka bricks 12″×6″ ×3″	400 Rs. per lakh.
Lime (marl), ...	15 Rs. per 100 maunds.
„ (stone), ...	1 Re. per maund.
Cartage, ...	4 annas per bullock.
Sal timbers, per cubic foot, ...	About 8 annas.
„ plank, per square foot, ...	About 3 annas (2″ thick).
„ wrought in bridges, &c., ...	About 12 annas per cubic foot.
„ piles, 12 feet long, ...	About 8 annas each.
Brick-work, per 100 cubic feet, ...	10 Rs.
Iron work, in bolts and straps, ...	15 or 16 Rs. per maund.

I have not ventured to estimate by any such prices. In an extensive work like the railway, a considerable enhancement, and, if European contractors be employed, an extravagant enhancement of all the ordinary rates must be looked for.

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The rates I have used are as follows:—

For Well sinking.—A rate based on the recorded experience of Colonel Baker in sinking blocks of moderate size at Indree bridge, on the Delhi canal. The rates of the large Roorkee blocks could scarcely furnish a fair standard. I have calculated on the area of (circular) wells at Colonel Baker's rate per 100 square feet for rectangular blocks, which will make the rate a liberal one for the wells.

For brick-work.—For detached small bridges, &c., I have calculated at Rs. 16 per 100 feet, instead of Rs. 10 as above. For the large bridges, Rs. 22 has been estimated when the bridge is arched, and Rs. 20, where the superstructure is of timber trusses.

Sal timber wrought in trusses, &c.—is calculated at Rs. 1-8-0 per cubic foot. This is twice Captain Maxwell's rate, and three-fifths of the Railway contractor's rate at Cawnpore. Considering the proximity of the Ramgunga forests, it ought to prove a very liberal one.

Wrought iron work in bolts, &c.—At 3¼ annas per lb or Rs. 18 per maund. This is a liberal rate.

Cast-iron.—At Rs. 16 per cwt. Captain Allen, at Roorkee, told me he hoped to execute cast-iron work there at Rs. 10.

Earth-work at Rs. 2.—The heavy railway bank in the Beerbhoom district is being done (without contract) by Mr. Sibley, considerably under this.

Timber, in sleepers.—At 1 rupee per cubic foot. The sleepers to be supplied by Captain Read to the East Indian Railway at Cawnpoor, are not to exceed Rs. 3 each, or about three-fifths of a rupee per foot.

Rails, at 160 Rs. per ton.—From enquiries which I wrote to England some months ago, I find that such rails as I propose to use for the lighter description of way (30 lb), would this Spring have cost (put on board-ship) about £ 8 per ton, ... Rs. 80

Freight, insurance, &c., by late information from East Indian Railway office, ...	13·5
Inland freight and transport, ...	66·5
	160·

APPENDIX D.

ESTIMATED COST OF LARGE BRIDGES ON THE LINE.

The following considerable rivers have to be bridged:—Beginning from Bareilly.

Names.	*Probable Waterway.*
1. Dorunneea, ...	Feet 160
2. Sunka, ...	„ 200
3. Dojora, ...	„ 800
4. Kosilla, ...	„ 500

Names.	*Probable Waterway.*	
5. Rajhera, ...	,, 120	
6. Ramgunga, ...	,, 2,700	
7. Gangun, ...	,, 300	
8. Ganges Khadir nullahs, say, ...	,, 800	
9. Chooeea and Eastern Kalee Nuddee, ...	,, 300	(*conjectural.*)
Total, ...	5,880	Feet.

Of these the Dojora is the deepest;—the Kosilla is an example of one of the shallower class of rivers. The drawing on which the estimates are based, shows one portion of a bridge adapted to the deep Dojora, and the other to the shallow Kosilla. It also shows such bridges, both in brick altogether, and also with brick piers and trussed timber superstructure.

The latter will cost probably as much* (at the estimated rates) as the former. But even if it does, the difficulty of getting a very large quantity of brick prepared at one place may compel the use of such bridges These are intended for either cattle draft, or locomotive of moderate weight.

A third simple timber bridge is shown in the drawing (Figure XI.) intended for cattle draft only. In the event of the latter railway being employed, bridges of all three kinds would be probably employed, and I have therefore taken an average of the three for insertion in the Railway estimate.

The estimates of these bridges I have made out in full detail, but it would be absurd to cumber this report with the figures.

The following is the

ABSTRACT.

Cost of one waterway (40′ span) of brick arch bridge over river like the Kosilla.

Well sinking in foundations.		
8 Wells, sunk 20 feet, at Rs. 26 each, ...	Rs.	208
Brick-work.		
Cubic feet 9,142, as per plan, at Rs. 22, ...	,,	2,011
Cornice.		
R. feet 94, at Re. 1-8, ...	,,	141
Cost of one waterway, ...		2,360

*It costs more, *vide inf.*

Cost of one abutment.		
28 Wells, sunk 20 feet, ...	„	712
Brick-work.		
Cubic feet 24,301, ...	„	5,346
Cornice, 53, ...	„	79-5
Cost of one abutment, ...	„	6,137-5
Cost of 2 abutments, ...	„	12,275
Cost of 12½ waterways, ...	„	29,500
Total cost of Kosilla bridge, 500 feet waterway,...	„	41,775
Cost of such a bridge, per 100 feet waterway, ...	„	8,355

Cost of one waterway of brick arch bridge over *river like* the Dojora:—

8 Wells, sunk 25 feet, at Rs. 43 each, ...	Rs.	344
Brick-work.		
Cubic feet 11,858, at Rs. 22, ...	„	2,608
Cornice as before, ...	„	141
Cost of one waterway, ...	Rs.	3,093
Cost of one abutment.		
30 Wells, sunk 25 feet, ...	Rs.	1,290
Brick-work.		
Cubic feet, 39,201, ...	„	8,624
Cornice, ...	„	79½
Cost of one abutment, ...	„	9,993½
Cost of two abutments, ...	„	19,987
Cost of 20 waterways, ...	„	61,860
Total cost of Dojora bridge, of 800 feet waterway,	„	81,847
And cost per 100 feet of waterway, ...	„	10,231
Cost of the former pattern as above, ...	„	8,355
	2	18,586
Mean cost of brick-arched bridges, per 100 feet of waterway, ...	Rs.	9,293 (A.)

Let the superstructure be of framed timber, as in the middle part of the drawing.

Cost of one waterway of such a bridge, adapted to the Kosilee.

Wells as before, ...	Rs.	208
Brick-work.		
Cubic feet 4,487, @ Rs. 20, ...	„	897
Agra Stone top to piers.		
Cubic feet 48, @ Re. 1-8, ...	„	72

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Sal timber, framed.		
Cubic feet 826, @ Re. 1-8, ...	„	1,239
Wrought-iron in tie-rods, bolts, &c.		
lbs. 2,500, @ 3½ annas, ...	„	547
Cast iron in Saddles, &c.		
Cwt. 4, @ Rs. 16, ...	„	64
Cost of one waterway, ...	Rs.	3,027
Cost of abutment.		
Wells as before, ...	Rs.	712
Brick-work.		
Cubic feet 21,139, @ Rs. 20, ...	„	4,228
Cost of one abutment, ...	Rs.	4,940
Cost of two abutments, ...	Rs.	9,880
Cost of 12½ waterways, ...	„	37,837
Total cost of such a bridge, ...	Rs.	47,717
Cost of 100 feet of waterway, ...	„	9,543

Cost of one such waterway adapted to the Dojora:—

Wells, ...	Rs.	344
Brick-work.		
Cubic feet 6,677, @ Rs. 20, ...	„	1,335
Roadway as above, viz., ...	„	72
	„	1,239
	„	547
	„	64
Cost of waterway, ...	Rs.	3,601
Cost of abutment.		
Wells, ...	Rs.	1,290
Brick-work.		
Cubic feet 34,894, ...	„	6,979
Cost of one abutment, ...	„	8,269
Cost of two abutments, ...	Rs.	16,538
Cost of 20 waterways, ...	„	72,020
Total cost of bridge, ...	Rs.	88,558

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Cost of 100 feet waterway, ...	Rs.	11,069
Cost of ditto, Kosilla pattern as above, ...	„	9,543
	2	20,612

Mean cost of trussed timber superstructure bridges at per 100 feet of waterway, ...	Rs.	10,306 (*B.*)

Cost of a simple timber bridge, 20 feet bays as in Drawing (Figure XI.):—

Cubic feet Sal timber 563, @ Rs 1-4 per foot, ...	Rs.	704
Iron lbs. 368, @ 3½ annas.	„	81
Driving piles, 5, @ 2 Rs. each, ...	„	10
TOTAL, ...	Rs.	795
Add for sundries, ...	„	55
Total cost of 20 feet waterway, ...	Rs.	850
Total cost of 100 feet waterway, ...	„	4,250 (*C.*)

We have then:—

Costs of alternative patterns of bridge per 100 feet waterway:—

A.—Brick, ...	Rs.	9,293	
B.—Brick and Timber, ...	„	10,306	
Mean of these two adapted to light locomotive trains, ...	„	9,800	... ... (*D.*)

Again:—

A.	Rs.	9,293	
B.	„	10,306	
C.—Simple timber, ...	„	4,250	
Mean of all three adapted to cattle-draft railway, ...	„	7,950	... ... (*E.*)
And consequently for the whole amount of 5,880 feet waterway, we have in the first case a total cost for bridging of ...	„	5,76,240	
And a cost per mile for this item of	„	4,802	... ... (*F.*)
In the second case, we have a total cost for bridging of	„	4,67,460	
And a cost per mile of	„	3,893	... ... (*G.*)

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APPENDIX E.

Abstract of a year's transport by Government Bullock Train, and its cost as derived from the accounts of the Allygurh district of Superintendence during the year 1854.

[N. B.—The district extends from Cawnpore to Delhi.]

	Between	*Weight carried. Maunds.*	*Distance.*	*Weight carried one Mile.*	*Total Maunds.*
a.	Allygurh and Cawnpore, ...	97,793	183	1,78,96,119	
a.	Ditto and Delhi, ...	67,169 }	80	68,61,200	
a.	Ditto and Meerut, ...	18,596 }			
a.	Ditto and Agra, ...	12,098	53	6,41,194	
	Agra and Cawnpore, ...	1,155	183	2,11,365	
	Mynpoorie and ditto, ...	1,545	110	1,69,950	
	Futtehgurh and ditto, ...	8,766	83	7,27,578	
					2,65,07,406

PASSENGERS CARRIED.

	Between	*No.*	*Distance.*	*No. of Passengers carried one Mile.*
a.	Allygurh and Cawnpore, ...	9,801	183	17,93,583
a.	Do. and Delhi, ...	6,951	80	5,56,080
a.	Do. and Meerut, ...	3,768	80	3,01,440
a.	Do. and Agra, ...	1,748	53	92,644

PASSENGERS CARRIED.

Between	*No.*	*Distance.*	*No. of Passengers carried one Mile.*
Cawnpore and Agra, ...	982	183	1,79,706
Do. and Mynpoorie,	No separate return.		
Do. and Futtehgurh, ...	1,127	83	93,541

Total passengers carried one mile, ...	30,16,994	
Equal at the rate of 3 maunds each, at which they are charged, to maunds, ...		90,50,982
GRAND TOTAL, MAUNDS, ...		3,55,58,388
Tons, @ 28 maunds, ...		12,69,942

The cost to Government of the above transport was—

Hire of Bullocks, ...	53,706 7 8	
Establishment, ...	9,849 13 2	
Repairs to Carts, ...	9,675 14 3	
		73,232 3 1

☞ Hence the cost per ton per mile is Rs., ... 0-0-11·072

The proceeds to Government are given only for the Allygurh Post Office, embracing the items marked *a. a.*

The mileage weight for these, taking the passengers @ 3 maunds, is ... ...Tons 12,01,063

The total receipts, ...	Rs.	1,16,542-11-6
Hence averaging per ton per mile, ...	„	0-1-6·624
And the average nett receipt per ton per mile is	„	0-0-7·552
The mileage number of passengers in the items *a. a.* is		27,43,747
And the receipt on this number, ...	Rs.	22,442-10-0
Hence the average rate per passenger, per mile, is only	„	0-0-1·57

ANNEXURE I.—No. II.—*From* FLEETWOOD WILLIAMS, ESQ., *Collector of Bareilly, to* R. ALEXANDER, ESQ., *Officiating Commissioner of Rohilkund, No.* 72, *dated the 7th February*, 1855.

I HAVE the honor to submit statements containing I believe all the information required in your letter of the 1st ultimo, No. 1.

2.—I have classified the return of traffic into importations and exportations, and into four main lines of road; viz., *1st*, the south and east, or the traffic from and to Futtehgurh and the stations below it on the Ganges; *2nd*, south-west, or the Hatras line with all the stations in that quarter—in this section all the traffic that goes to Central India is included; *3rd*, north-west, or the Chundowsee line—in this all the traffic to stations on this side the Ganges, viz., Rampore, Moradabad and Bijnour, are included as well as Chundowsee, and this section shows the traffic which eventually goes to the Delhi or Rohtuck districts, and to the Cis and Trans-Sutledge country. There are two intermediate lines; viz., by Anoopshuhur and Ramghât; the totals of these have been so placed that they may be added either to the south-west or north-west line.

3.—I believe this classification will be found convenient, as the decision as to the line of railway will be influenced to some extent by the direction which the greater portion of the traffic takes.

4.—Before commenting upon the results shown by the returns, I had better, as requested in your letter of the 20th January, 1855, No. 11, show how far they are worthy of credit.

5.—Those from Pilibheet have been prepared by the tehseeldar, a very intelligent man, with the assistance of the commercial agents, "arrutheeahs," from their books, and as far as these returns go I believe they may be held to be correct. But there is probably a great deal of traffic which does not find entry in the agent's books; these will only show the transaction of large dealers: there is no doubt a great deal of business done by small traders on their own account, and much traffic carried by such people on their own carts, camels, buffaloes, bullocks, ponies, and donkeys, for strings of all are constantly on the roads.

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6.—In short, the Pilibheet entries may be all assumed to be correct returns of a large portion of the traffic between that town and other places, and the totals may be relied on as a safe minimum. One point must be noticed regarding these returns, and that is,—there is little intermediate agency between the places whence goods are imported or to which they are exported, and Pilibheet goods are dispatched right through, to and from agents' establishment in Pilibheet. This accounts for there appearing to be no traffic between Pilibheet and the large mart of Chundowsee.

7.—The other entries in the returns are not taken from actual accounts, but are estimates prepared from enquiries from commercial agents, chowdries of trades, and such people; generally the parties questioned have answered correctly as far as their own actual dealings enabled them.

8.—The process of the enquiry was this:—The larger dealers were collected and told to state the amount of goods which passed through their hands. This they could do correctly. They then collectively estimated the probable amount which passed through the hands of smaller dealers in their markets or trades, or towns or villages.

9.—The last is merely an estimate, but still such people know pretty nearly each in his particular line the amount of such traffic, and I believe there is no danger of their having over-estimated—there must be a considerable amount of traffic of which they have no knowledge. The best description to give of the returns from all the other places, excepting Pilibheet, is, that they may be assumed to be tolerably correct estimates, rather under than over the real amount of traffic. I have had two statements prepared of the area, population, and estimated produce of the district; I think they show that the estimate of exports has not been exaggerated.

10.—I believe the statements and remarks contain answers to all your queries. I will therefore proceed to abstract from the returns of traffic such information as tends to indicate what line a railway should take.

11. Of the total imports and exports, it would appear from the returns that the south-west line has much the largest share,—the traffic on it exceeding that on the north-west line by more than 1,69,000 maunds. But the preponderance of the south-west traffic is not confirmed by the Pilibheet accounts. Should there be any doubt regarding the Bareilly estimates, the exports from Bareilly and Pilibheet, respectively, to the north-west are 5,93,569 and 1,30,243; those to the south-west are 10,41,266 and 49,440—that is, the returns based on actual accounts show in favor of the north-west line; those based on estimate in favor of the south-west line.

12.—Without impugning the estimates, it may be safer to be guided by the accounts, and, taking into consideration the amount of imports and exports which travel what I shall call the main Rohilkund line—that is,

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from Futtehgurh to the Ganges at Gurhmuktesur Ghât—and the account of traffic in other districts of the province which travels this main line, I think it is most probable that the returns of traffic of the whole division will tell in favor of this line, in opposition to the south-west one.

13.—I cannot suppose that when railways are once introduced the system will be confined to one line for such a province as Rohilkund; there will be doubtless a cross line from Pilibheet to Central India. But to begin with a cross line now would be equivalent to depriving the greater part of Rohilkund of the benefit of the contemplated railway, and as on such a road being opened a considerable portion of the traffic which now goes direct across would no doubt go round by Delhi, I think the main line for Rohilkund, from Futtehgurh to Gurhmuktesur Ghât, should be preferred to the cross south-west line.

14.—There is such a considerably larger extent of country opened up by this line; such a very large number of passengers would be carried on it, not only from one large town of Rohilkund to another, but from Oudh and Rampore to different parts, north-west, and south, and east; and there would be such an increase of importations of European goods from Calcutta when the completion of the railway from the sea lowered prices,—that I have no doubt eventually the propriety of commencing with this line would be proved.

15.—I believe it is not intended to undertake at once such an extensive work as the whole length of this line would be; that it is in contemplation to begin with a much shorter line as an experiment; and that the apparent importance of Chundowsee has suggested the propriety of commencing with a line from Chundowsee to the Ganges.

16.—Whatever may be the present apparent recommendation of such a line—and difficult as it is to suggest one of equal, or nearly equal, length to commence with in preference—I would strongly deprecate such a course.

17.—I consider that it must be at once decided whether Rohilkund and its large districts, Shahjehanpore, Bareilly, Moradabad, Bijnour, and the territory of Rampore, with the large towns, are to be sacrificed for Chundowsee, or whether this deteriorating mart must be sacrificed for the good of the province; and I think it would not be a fair test of the probable results and benefit of the introductions of railways to commence with such a short piece, on a line which will attract but a small portion of the traffic; and though I have not been called upon to advert to any local difficulties, and on the contrary you have suggested that such matters will be considered in the preliminary survey of the country, I think I shall be excused for noticing the great difficulty of connecting Chundowsee with the towns of this district.

18.—From Bareilly, for at least 16 miles the line would run along the bank of the Ramgunga, the two streams of which—one under Bareilly and

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one near Gynee—would have to be crossed. Along the whole line the country is low and flat, and subject to inundation, the Ramgunga throwing out its floods across the whole of the road, not in well-defined lines of drainage, but in large sheets. This very serious enemy on the flank would threaten the whole course of the road, from Bareilly to the high ground which trends from Ounlah to Seroulie, and still there would be the drainage of the valley of the Urril to cross.

19.—Knowing the country as I do, I believe this is if not an insuperable difficulty at least a fatal objection to the adoption of the Chundowsee line. It would be better to face the whole length of a road from Futtehgurh to Gurhmuktesur than the shorter distance from the Ganges to Bareilly, viâ Chundowsee, with this 16 miles of what will really be stupendous work.

20.—I believe, in an engineering point of view, the best line for the road would be to cross the Ganges and Ramgunga at a right angle to their course opposite Futtehgurh, and then get at once out of those floods, instead of taking the present course directly along the most part of the floods to Jullalabad, and then again crossing a considerable line of drainage to Shahjehanpore.

21.—There is a considerable angle in this old course, which would be avoided by going direct from the bank of the Ramgunga, opposite Futtehgurh, to a Shahjehanpore terminus on the right bank of the Gharah, opposite that town.

22.—This direct line would be between the floods of the Ramgunga and those of the Gharah. The road of course would be raised above all floods, and by leaving the excavation for the earthwork on each side carried with proper levels all along the sides of mebankments, so as to carry down any cross drainage, I believe it would be unnecessary to provide any water-way in the line, and thus the expense of bridges would be avoided.

23.—The line which has been made from Shahjehanpore to Jullalabad would still be required as a district road. Between Jullalabad and Futtehgurh as yet, I believe, no expensive works have been constructed.

24.—From the right bank of the Gharah at Shahjehanpore to the Ramgunga on the Moradabad and Bareilly road, under the town of Moradabad, there are no serious difficulties. The Dojora and Kosi are considerable streams, but 600 or 700 feet of waterway would suffice for each. Besides these, save the Bygool between Shahjehanpore and Bareilly, the Nukutteea just under Bareilly on that line, and the Jooa just out of Bareilly on the Moradabad side, there are no rivers, and the whole of the line from Shahjehanpore to the Rumgunga at Moradabad is free from floods.

25.—I believe that the best point for re-crossing the Ramgunga will be found to be under Moradabad. I have pointed out the difficulty it pre-

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sents on the Chundowsee line. I believe its floods will require more than a mile of waterway at any other point in this district.

26.—Altogether, I think that whether the amount of traffic is considered, or the greatest advantage to the greater part of Rohilkund, or the best line in an engineering point of view, *the* line for a Railway is from Futtehgurh by Shahjehanpore, Bareilly and Moradabad, to Gurhmuktesur Ghât.

27.—I believe also that to give a fair trial to the experiment,—if the introduction of railways can be called an experiment,—the whole line should be undertaken, as no short piece could be in my opinion selected which would fairly test the advantage to the division, or the pecuniary result to Government, of the introduction of a railway.

28.—I believe the returns of traffic show that a line from the Ganges at Futtehgurh to the Ganges at Gurhmuktesur will certainly pay; when the great return that may be safely reckoned on from passengers is added there should be on doubt on the subject.

29.—I can suggest no other work of magnitude which should be undertaken in Rohilcund—at least in this district. Indeed, the road I have advocated would be as much as the Government could undertake, and as much as the greatest well-wisher of the province could at present desire.

30.—A canal from the Saardah would be a grand and profitable work, were not the tract of country under British rule which could be irrigated by it so circumscribed by Oudh.

31.—I conclude that the continuation of the Pilibheet road to Agra by Budaon will be undertaken by the local Government. Were this road completed by the local Government, and the Railway constructed, the local funds would be relieved of a very great burden, and this district at least would soon be covered with a network of district roads, and the means of communication would be as perfect as they are now notoriously bad.

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ANNEXURE II.—*Statement showing*

1.	2.	Exported from places entered in					
		3.		4.		5.	
		City of Bareilly.		City of Pillbheet.		Pergunnah Newabgunge.	
Direction.	Cities.	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*
			Mds.		Mds.		Mds.
South & East.	Furruckabad,...	Grain, ...	9000	Rice, ...	652	...	...
		Treacle, ...	4000	Kerana,	2054		
		Setrinjees,	700				
		Shoes, and			2706		
		Silver and Gold lace,	10				
			13710				
	Cawnpore, ...	Grain, ...	46000	Kerana,	140	...	...
		Treacle, ...	6000				
		Hides, ...	1650				
		Reeds, ...	40				
			53690				
	Mirzapore, ...	Grain, ...	20000	Rice, ...	1930	...	...
				Kerana,	4008		
	Benares, ...				5938		
	Ghazeepoor, ...						
	Kheree Luhurpoor, ...						
	Shahabad, ...						
	Madhogunge,						
	Oude, ...	Setrinjees,.	1000	...	...	...	...
	Khodagunj, ...						
	Shahjehanpore,	Cloth Pcs.	600	...	...	...	...
		Shoes, &c.	17				
			617				
N. W.	Delhi, ...	Rice, ...	25000	Rice, ...	45926	...	...
		Sugar, ...	2525	Goor, ...	436	...	...
		Silver and Gold lace &c., ...	295	Kerana,	2482	...	...
					48844		
			27820				
	Rewaree, ...	Rice, ...	102000	Rice, ...	15550	...	...
		Goor, ...	18000	Goor, ...	280		
				Kerana,	10098		
			120000				
					25928		

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the Exportation of Goods.

COLUMNS 3 TO 9, TO PLACES IN COLUMN 2.										
6. Pergunnah Doonka.		7. Pergunnahs Jehanabad & Ritcha.		8. Pergunnah Fureedpoor.		9. Pergunnah Besulpoor.				
Kind of Goods exported.	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Total quantity of Goods Exported.*	*Point at which trade from each of the places named in Columns 3 to 9 reaches the Ganges.*	REMARKS.
	Mds.		Mds.		Mds.		Mds.	Mds.		
...	...	...	...	...	...	...	...	16416	Ganges at Furruckabad, 1,05,584 mds.	
...	...	...	...	Grain,	9400	...	...	63230		
...	...	...	...	...	...	...	...	25938		
...	...	...	...	...	...	Cl. Pcs.	2	1002	Inland Stations, 1,619 mds.	
...	...	...	...	...	...	...	...	617		
...	...	Rice,	40500	...	...	Sugar,	5500	126064	...	
...	...	...	...	...	...	Goor,	1500			
...	...	...	...	...	...	Rice,	1900			
							8900			
...	...	...	...	...	...	...	...	145928		

Statement showing the Ex-

1.	2.	EXPORTED FROM PLACES ENTERED IN 3.		4.		5.	
		City of Bareilly.		City of Pilibheet.		Pergunnah Newabgunge.	
Direction.	Cities.	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*
			Mds.		Mds.		Mds.
N. W.	Behree, ...	...	...	Rice, ...	1288	...	...
				Sugar,...	1550		
					2838		
	Bhewanee, ...	Rice, ...	101000	Rice, ...	19850	...	...
				Kerana,	4512		
					23362		
	Meerut, ...	Broom-sticks,	50	Rice, ...	1388	...	...
				Sugar,...	250		
				Kerana,	600		
					2238		
	Rohtuck, ...	...	...	Kerana,	40	...	...
	Hauper, ...	...	...	Rice, ...	2536	...	...
				Sugar,...	190		
				Goor, ...	150		
				Kerana,	15		
					2891		
	Sadilpoor, ...	...	...	Kerana,	140	...	...
	Furooknuggur,	...	...	Rice, ...	1526	...	...
	Shadra, ...	...	...	Sugar,...	800	...	...
	Khoorja, ...	...	...	Rice, ...	2402	...	...
				Sugar,...	1075		
				Goor, ...	475		
				Kerana,	275		
					4227		
	Pulwul, ...	...	...	Rice, ...	1782	...	...
	Jhujjur, ...	...	...	Rice, ...	4081	...	...
	Ulwur, ...	...	...	Goor, ...	150	...	...
	Unoopshuhur,	...	...	Goor, ...	1075	...	...
	Rajgurh, ...	...	...	Rice, ...	4783	...	...
				Sugar,...	210		
				Goor, ...	817		
				Kerana,	227		
					6037		
	Noh, ...	...	...	Rice, ...	1442	...	...
				Kerana,	30		
					1472		

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portation of Goods,—(Continued.)

Columns 3 to 9, to places in Column 2.										
6.		7.		8.		9.				
Pergunnah Doonka.		Pergunnahs Jehanabad & Ritcha.		Pergunnah Fureed-poor.		Pergunnah Besulpoor.				
Kind of Goods exported.	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Total quantity of Goods Exported.*	*Point at which trade from each of the places named in Columns 3 to 9 reaches the Ganges.*	Remarks.
	Mds.		Mds.		Mds.		Mds.	Mds.		
...	...	...	...	...	...	...	...	2838	Gurhmuktesur Ghât, 4,51,177 mds.	
...	...	Rice,	25700	...	...	Sugar, Goor, Rice,	4000 500 700 5200	158262		
...	...	Rice,	10400	...	...	...	...	12688		
...	...	...	...	...	...	...	...	40		
...	...	...	...	...	...	...	...	2891		
...	...	...	...	...	...	...	...	140		
...	...	...	...	...	...	...	...	1526		
...	...	...	...	...	...	...	...	800		
...	...	Rice,	25000	...	...	...	...	29227	Unoopshehur Ghât, 43,824 mds.	
...	...	...	...	...	...	...	...	1782		
...	...	...	...	...	...	...	...	4081		
...	...	...	...	...	...	...	...	150		
...	...	...	...	...	...	...	...	1075		
...	...	...	...	...	...	...	...	6037		
...	...	...	...	...	...	...	...	1472		

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Statement showing the

		Exported from places entered in					
1.	2.	3.		4.		5.	
		City of Bareilly.		City of Pilibheet.		Pergunnah Newabgunge.	
Direction.	Cities.	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*
			Mds.		Mds.		Mds.
N. W.	Putteala, ...	...	...	Rice, ... Goor, ...	2500 312 2812	...	...
	Cabul, ...						
	Rampoor, ...	Betel leaves,	845	...	...	...	...
	Moradabad, ...	Betel leaves, Kerana,	417 9 426	...	...	...	...
	Thakoordwara,						
	Umroha, ...						
	Nujeebabad, ...						
	Chundowsee,...	Rice, ... Goor, ... Sugar, ... Kerana, ... Silver and Gold lace, &c., ...	305000 28000 4135 2925 368 340428	...	...	...	...
	Bilsee, ...						
S. W.	Kosee, ...	Goor, ... Sugar, ...	27000 1582 28582	Rice, ... Goor, ... Kerana,	1832 475 53 2360	...	...
	Koel, ...	Rice, ... Goor, ...	25000 2000 27000	Rice, ... Sugar,... Goor, ... Kerana,	12976 275 415 15 13681	...	...
	Bhurtpoor, ...	Rice, ... Goor, ... Sugar, ...	107000 13000 507 119507	Goor, ...	406	...	...
	Agra, ...	Rice, ... Goor, ... Set rinjee, &c., ...	125000 2500 375 127875	Rice, ... Sugar,... Kerana,	3020 235 91 3346	...	...

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Exportation of Goods,—(Continued.)

Columns 3 to 9, to places in Column 2.										
6.		7.		8.		9.				
Pergunnah Doonka.		Pergunnahs Jehanabad & Ritcha.		Pergunnah Fureed-poor.		Pergunnah Besulpoor.				
Kind of Goods exported.	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Total quantity of Goods Exported.*	*Point at which trade from each of the places named in Columns 3 to 9 reaches the Ganges.*	Remarks.
	Mds.		Mds.		Mds.		Mds.	Mds.		
...	...	...	...	...	...	...	...	2812	Darahnuggur Ghât, 2,812 mds.	
...	...	...	...	...	...	...	...	845	Inland Stations, 3,73,999 mds.	
...	...	...	...	...	...	...	...	426		
Grain, Goor,... Rice,... Iron, Sugar, Joar,&c.	6500 2250 4300 400 2150 1100 20300	Rice,	12000	...	...	...	...	372728		
...	...	Rice,	30600	...	...	...	...	61542	Ram Ghât, Zh. Allygurh, 1,10,823 mds.	
...	...	Rice,	8600	...	...	...	...	49281		
...	...	Rice,	40800	...	...	Sugar, Goor, Rice,	2500 2170 5200 9870	170583		
...	...	...	...	...	...	Sugar, Goor, Rice,	5000 2280 4400 11680	142901		

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Statement showing the

1.	2.	EXPORTED FROM PLACES ENTERED IN					
		3.		4.		5.	
		City of Bareilly.		City of Pilibheet.		Pergunnah Newabgunge.	
Direction.	CITIES.	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*
			Mds.		Mds.		Mds.
S. W.	Muttra, ...	Rice, ...	175000	Rice, ...	5810	...	...
		Goor, ...	35000	Goor, ...	2156		
		Sugar, ...	11125				
		Broom-sticks, ...	100		7966		
			221225				
	Hatrass, ...	Rice, ...	150000	Rice, ...	18830	Rice,	87500
		Goor, ...	56000	Sugar, ...	250	Sugar,	3300
		Sugar, ...	6357	Goor, ...	3000		90800
		Kerana, ...	6200	Kerana,	1231		
			218557		18311		
	Gungapar, ...	Rice, ...	121000	...	...	...	...
		Sugar, ...	1114				
		Goor, ...	22000				
		Kerana, ...	1107				
			145221				
	Gwalior, ...	...	...	...	...	...	...
	Sadopoor, ...	Rice, ...	101000	...	...	...	...
		Sugar, ...	2005				
		Broom-sticks, ...	150				
			103155				
	Khasgunj, ...	...	...	Sugar, ...	507	...	...
	Jeypoor, ...	Rice, ...	50000	...	...	...	...
	Bela, ...	...	...	Goor, ...	200	...	...
	Sekundra, ...	...	...	Sugar, ...	160	...	...
	Deeg, ...	...	...	Goor, ...	610	...	...
	Sekundrabad,	...	...	Rice, ...	1363	...	...
	Mynpooree, ...						
	Etawah, ...						
	Koonch, ...						
	Calpee, ...	...	...	Goor, ...	530	...	...

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Exportation of Goods,—(Continued.)

COLUMNS 3 TO 9, TO PLACES IN COLUMN 2.

6.		7		8		9				
Pergunnah Doonka.		Pergunnahs Jehanabad & Ritcha.		Pergunnah Fureed-poor.		Pergunnah Besulpoor.				
Kind of Goods exported.	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Total quantity of Goods exported.*	*Point at which trade from each of the places named in Columns 3 to 9 reaches the Ganges.*	REMARKS.
	Mds.		Mds.		Mds.		Mds	Mds.		
...	...	Rice,	32200	...	...	Sugar, Goor, Rice,	9000 2400 2800 14200	275591	Kutchla Ghât, Zillah Budaon, 13,09,059 mds.	
Wheat, Goor, Rice, Iron, Mukka, &c., Sugar,	9000 6800 15700 4000 6000 3750 45250	Rice,	40700	...	...	...	...	413618		
...	...	...	...	...	...	...	...	145221		
...	...	...	...	...	...	Sugar, Goor,	4000 1150 5150	5150		
...	...	...	...	...	...	...	...	103155		
...	...	...	...	...	...	...	...	507		
...	...	...	...	...	...	...	...	50000		
...	...	...	...	...	...	...	...	200		
...	...	...	...	...	...	...	...	160		
...	...	...	...	...	...	...	...	610		
...	...	...	...	...	...	...	...	1363		
...	...	...	...	...	...	...	...	530	Udhur Ghât, Zh. Budaon, 530 mds.	

Statement showing the

1.	2.	Exported from places entered in 3.		4.		5.	
		City of Bareilly.		City of Pilibheet.		Pergunnah Newabgunge.	
Direction.	Cities.	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*
			Mds.		Mds.		Mds
S. W.	Budaon, ...	Shoes, ...	15	...	...	...	...
		Silver & Gold Lace,	7				
		Betel Leaves,	122				
			144				
	Hills.						
N.	Sarda, ...						
	Forest, ...						
	Birmdeo, ...						
	Huldwanee, ...						
	Total of Exported Goods, ...	...	1723852	...	188467	...	90800
	Consumption of the district,	...	2241742	...	133759	...	105103
	Grand Total,...	...	3965594	...	322226	...	195903

ABSTRACT.

Goods crossing the Ganges, ...
Goods sent to Oude, ...
Consumption of Rohilcund, ...

Add:—

Goods (Country produce) sent by resident merchants to Calcutta, viâ

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Exportation of Goods,—(Concluded.)

Columns 3 to 9, to places in Column 2.										
6.		7.		8.		9.				
Pergunnah Doonka.		Pergunnahs Jehanabad & Ritcha.		Pergunnah Fureed-poor.		Pergunnah Besulpoor.				
Kind of Goods exported.	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Kind of Goods exported.*	*Quantity.*	*Total quantity of Goods exported.*	*Point at which trade from each of the places named in Columns 3 to 9 reaches the Ganges.*	Remarks.
	Mds.		Mds.		Mds.		Mds.	Mds.		
...	...	...	...	...	...	...		144	Inland Stations, 144 mds.	
...	65550	...	266500	...	9400	...	55002	2399571		
...	115090	...	734427	...	23470	...	34836	3388427		
...	180640	...	1000927	...	32870	...	89838	5787998		

						Maunds.
	...	...	...	...	...	20,23,809
	...	...	...	...	...	1,002
	...	...	...	...	...	37,63,187
			Total,		...	57,87,998
Furuckabad,			...	...	...	5,260
			Grand Total,		...	57,93,258

ANNEXURE III. *Statement showing the*

		IMPORTATION OF GOODS FROM PLACES							
1.	2.	3.		4.		5.		6.	
		Bareilly Town.		Pilibheet Town.		Pergunnah Newabgunge.		Pergunnah Doonka.	
Direction.	CITIES.	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*
			Mds.		Mds.		Mds.		Mds.
S. & E.	Furruckabad, ...	Cloth pieces, ... Iron and other hard ware, ... Kerana or Spices, & Medicinal roots, ... Betel or Pawn leaves, ...	8750 6223 10050 870 20893	Iron & Brass, Cloth pieces, Fruits,	4650 800 237 5687	...	...	...	...
	Cawnpore, ...	English Stationery and Glass ware, ...	4 245 249	...	...	...	...	...	...
	Mirzapore, ...	"	"	...	...	...	...	...	...
	Benares, ...	Toys, ...	15	...	...	...	...	...	...
	Ghazeepore, ...	Opium, ...	22						
	Kheree Luhurpoor, ...	Tobacco,	5000	...	...	...	...	...	...
	Shahabad, ...	Poppy heads, ...	20	...	"	...	...	...	...
	Madhogunj, ...	Betel leaves, ...	2323	...	...	...	...	...	...
	Oude, ...	Tobacco,	2000	...	...	...	...	...	...
	Khodagunj, ...	Raw Sugar, ...	1100	...	...	...	...	...	...
	Shajehanpore,	"	"	Salt,	837	...	...	...	...
	Delhi, ...	Salt, ... Cotton, ... Shoes, &c.,	500 300 61 871	Cotton,	240 1077				
	Rewaree, ...	"	"	Salt, Cotton,	6325 1000	...	...	...	...
	Behree, ...	"	"			...	...	...	...
	Bhewanee, ...	"	"	...	...	...	...	...	...
	Meerut, ...	"	"	...	...	...	...	...	...
	Rohtuck, ...	"	"	...	...	...	...	...	...
	Hauper, ...	"	"	...	...	...	...	...	...
	Sadelpore, ...	"	"	...	...	...	...	...	...
	Farooknuggur,	"	"	...	...	...	...	...	...
	Shadra, ...	"	"	...	...	...	...	...	...
	Khoorja, ...	"	"	...	...	...	...	...	...
	Pulwul, ...	"	"	...	...	...	...	...	...
	Jhujjur, ...	"	"	...	...	...	...	...	...
	Ulwur, ...	"	"	...	...	...	...	...	...

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Importation of Goods.

ENTERED IN COLUMN 2, TO PLACES IN COLUMNS 3 TO 9.

7. Pergunnahs Jehanabad & Kitchu.		8. Pergunnah Fureedpoor.		9. Pergunnah Besulpoor.		Total.	Point at which trade from each of the emporia named in Column 2 reaches the Ganges.	REMARKS.
Kind of Goods' Imported.	Quantity.	Kind of Goods imported.	Quantity.	Kind of Goods imported.	Quantity.	Quantity of Goods.		
	Mds.		Mds.		Mds.	Mds.		
		Iron, ...	50	Cloth pieces,	1	26631	Furruckabad, 26,917 maunds.	The Cloth Merchants pay at present hire for Cloth as follows:— 200 Rs. worth of English Cloth as 1 maund. 100 Rs. worth of Country Cloth as 1 maund. This maund is the Bareilly maund This Statement, as prepared, shows Company's weight; 1 maund Bareilly weight=1 maund 10 seers Company's weight; and the weight of Cloth has therefore been calculated as 200 Rs. worth English cloth Company=1 maund 10 seers, and 100 Rs. Country Cloth=1 maund 10 seers.
...	...	...	...	...	...	249		
...	...	...	...	...	...	15		
...	...	...	...	...	...	22		
...	...	Tobacco,	50	...	...	5050		
...	...	...	...	...	...	20	Inland Stations, 10,493.	
...	...	...	...	...	...	2323		
...	...	...	...	...	...	2000		
...	...	...	...	...	...	1100		
...	...	...	...	...	...	1948	Gurhmuktesur, 16,817 maunds.	
...	...	...	...	...	...	6325		
...	...	...	...	...	...	1000		
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		
...	...	...	...	...	...	7544		
...	...	...	...	...	...	"		
...	...	...	...	...	...	460	Unoopshehur Ghât, 5,101 mds.	
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		
...	...	...	...	...	...	"		

Statement shewing the

1.	2.	Importation of Goods from places							
		3.		4.		5.		6.	
		Bareilly Town.		Pilibheet Town.		Pergunnah Newabgunj.		Pergunnah Doonka.	
Direction.	Cities.	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*
			Mds.		Mds.		Mds.		Mds.
N. W.	Unoopshehur,...								
	Rajghur, ...								
	Noh, ...			Salt, ...	4641	...	...	...	...
	Putteeala, ...			...	...	...	...	...	...
	Cabul, ...	Churus,...	400	...	...	...	...	...	...
		Fruits, ...	500						
			900						
	Rampoor, ...	* Bybh,...	618	...	...	...	...	...	...
		Hides, ...	525						
			1143						
	Moradabad,	Cloth pieces, ...	250	...	...	...	...	...	...
		Blankets,	37						
			287						
	Thakoordwara,	Cloth pieces, ...	500	...	...	...	...	...	...
	Umroha, ...	Native Combs,...	105	...	...	...	...	...	...
	Nujeebabad, ...	Blankets,	90	...	...	...	...	...	...
	Chundowsee,	Moong Dal, ...	60000	...	...	...	...	Salt, ...	533
		Salt, ...	25125					Cotton,	692
		Cotton and Blankets,	205					Iron, ...	47
			85330						1272
S. W.	Bilsee, ...	Cotton,...	200	...	...	...	...	...	...
	Kosee, ...	Ditto, ...	500	...	...	...	...	...	...
	Koel, ...	"	"	...	...	...	...	...	...
	Bhurtpoor, ...	"	"	...	...	...	...	...	...
	Agra, ...	"	"	...	...	...	...	...	...
	Muttra, ...	Cotton,...	400	...	...	...	...	...	...
	Hatrass, ...	"	500	Cotton,	200	Salt,	3403	Salt, ...	250
	Gungapur, ...	Ghee, ...	14000	...	...	...	...	...	...
	Gwalior, ..	Iron, ...	2000	...	...	...	...	...	...
	Khassgunj, ...	"							
	Sadopoor, ...								

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Importation of Goods,—(Continued.)

ENTERED IN COLUMN 2 TO PLACES IN COLUMNS 3 TO 9.									
7.		8.		9.					
Pergunnahs Jehanabad and Ritcha.		Pergunnah Fureedpoor.		Pergunnah Besulpoor.			TOTAL.	*Point at which trade from each of the emporia named in Column 2 reaches the Ganges.*	REMARKS.
Kind of Goods imported.	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*		*Quantity of Goods.*		
	Mds.		Mds.		Mds.		Mds.		
...	...	...	...	...	...	...	4641	Unoopshuhur Ghât, 5,101 Mds.	
...	...	...	...	...	...	...	,,	Daranugur ghât, 900 mds.	
...	...	...	...	...	...	...	900		
...	...	...	...	...	...	...	1143	Inland Station, 95,877 Mds.	* Bybh is a fine kind of jungle grass.
...	...	...	...	...	...	...	287		
...	...	...	...	...	...	...	500		
...	...	...	...	...	...	...	105		
...	...	...	...	...	...	...	90		
Salt, ...	5950	...	...	...	...	...	92552		
Oord Dal,	500	...	...	...	...	...	700		
...	...	...	...	...	...	...	500	Ram ghât Zh. Aligurh 500 m.	
...	...	...	...	...	...	...	,,		
...	...	...	...	Salt, ...	3750	...	4500	Kutchla ghât, Zillah Budaon, 87,584 mds.	
				Cotton, ..	750				
					4500				
...	...	...	...	Cotton, ..	375	...	375		
...	...	...	...	Salt, ...	4750	...	6400		
				Cotton, ..	1250				
					6000				
...	...	Salt, ...	1210	Cotton, ..	1375	...	8588		
		Cotton,	150	Salt, ...	1500				
			1360		2875				
...	...	...	...	...	...	...	14000		
...	...	Iron, ...	60	Ghee, ...	43	...	2478		
				Iron, ...	375				
					418				

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Statement shewing the

1.	2.	Importation of Goods from places			
		3. Bareilly Town.		4. Pilibheet Town.	
Direction.	Cities.	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*
			Mds.		Mds.
S. W.	Choorneepoor,				
	Bela, ...				
	Secundra, ...				
	Deeg, ...				
	Secundrabad,				
	Mynpoorie, ...	Iron, ...	1050	...	...
	Etawah, ...	,,	,,	...	...
	Koonch, ...	,,	,,	Cloth pieces,...	1200
	Calpee, ...	,,	,,	...	...
	Budaon,	Broom-sticks, ...	125	...	...
N.	Hills, ...	Kerana or spices, & medicinal roots, ...	10000	...	...
		Ghee, ...	6000		
		Bybh, ...	9000		
		Fruits, &c.,	115		
			25115		
	Sarda, ...	Reeds, ...	150	...	...
	Forest, ...	Moonj, ...	500	...	...
		Charcoal,	15625		
			16125		
	Birmdeo, ...	,,	,,	Ghee,...	1250
				Kerana,	19642
					20892
	Huldwanee, ...	,,	,,	,,	,,
	Total of Imported Goods, ...	,,	179013	,,	51026
	Produce of the District, ...	,,	3786581	,,	271200
	Grand Total, ...	,,	3965594	,,	322226
			Bareilly has 2 principal marts: one the town of Bareilly, the other Futtehgunj, 11 miles N.-W. of Bareilly.		Pilibheet has 3 emporias: one the city of Pilibheet, the other Neoreea Hoseinpoor, 9 miles N. of it, and the third Bhekareepoor, 4 miles N.-W. of it.

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Importation of Goods,—(Concluded.)

ENTERED IN COLUMN 2, TO PLACES IN COLUMNS 3 TO 9.

5. Pergunnah Newabgunj.		6. Pergunnah Doonka.		7. Pergunnahs Jehanabad & Ritcha.	
Kind of Goods imported.	*Quantity.*	*Kind of Goods imported.*	*Quantity.*	*Kind of Goods imported.*	*Quantity.*
	Mds.		Mds.		Mds.
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	Ghee,	500
...	...	...	...	...	...
...	...	...	...	...	...
...	...	...	...	...	...
"	"	Iron,	168	...	...
"	3403	"	1690	"	6950
"	192500	"	178950	"	993977
"	195903	"	180640	"	1000927
	Newabgunj has 3 marts: one Newabgunj Khas, the other Sythul, 4 miles W. of it; third, Burour, 7 miles N.-W. of it.		Doonka has 6 marts: viz., Shahee, Doonka, Sheesgurh, Khatha and Meergunj.		Jehanabad has 2 principal marts, viz: Jehanabad Khas and Purewa.

Statement shewing the

Direction.	Cities.	IMPORTATION OF GOODS FROM PLACES ENTERED			
		8.		9.	
		Pergunnah Fureedpoor.		Pergunnah Besulpoor.	
		Kind of Goods imported.	*Quantity.*	*Kind of Goods imported.*	*Quantity.*
			Mds.		Mds.
S. W.	Choorneepoor, ...				
	Bela, ...				
	Secundra, ...				
	Deeg, ...				
	Secundrabad, ...				
	Mynpoorie, ...	Iron, ...	50	Ghee, ...	81
	Etawah, ...	...	...	Ditto, ...	62
	Koonch, ...	...	...	Cloth pieces, ...	2
	Calpee, ...	...	...	...	...
	Budaon, ...	...	...	...	...
N.	Hills, ...	...	...	...	...
	Sarda Forest, ...	...	...	...	...
	Birmdeo, ...	...	...	Ghee, ...	20
	Huldwanee, ...	...	...	...	...
	Total of Imported Goods, ...	"	1570	"	14384
	Produce of the District, ...	"	31300	"	75504
	Grand Total, ...	"	32870	"	89838
			Fureedpoor has 2 marts: viz., Fureedpoor Khas and Futtehgunj.		Two principal marts in Besulpoor are—Besulpoor itself & Bilsunda.

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Importation of Goods,—(Concluded.)

IN COLUMN 2 TO PLACES IN COLUMNS 3 TO 9.

	Total. *Quantity of Goods.*	*Point at which trade from each of the emporia named in Column 2 reaches the Ganges.*
	Mds.	
...	1181	Kutohla Ghât, Zillah Budaon, 87,584 mds.
...	62	
...	1202	Gudhea Ghât, Zillah Budaon, 1,202 mds.
...	0	
...	125	Inland Station, 63,095 maunds.
...	25615	
...	150	
...	16125	
...	20912	
...	168	
...	257986	
...	5530012	
...	5787998	

REMARKS.

ABSTRACT.

	Maunds.
Goods crossing the Ganges, ...	89,021
Goods, the produce of Oudh, ...	9,393
Produce of Rohilkund, including Hills, ...	1,59,572
Total, ...	2,57,986
Produce of the District, ...	5,53,012
Grand Total, ...	57,87,998
ADD:	
English Goods, including Wines and Liquors, by resident merchants, ...	1,057*
Total of all,	57,89,055

* This statement has been given by the merchants of this place, but the great import of Europe goods for European residents of the station is not nearly represented by them. No estimate, however, can be made of this kind of imports. It must be some thousands of maunds.

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ANNEXURE IV.—*Abstract Statement of Importation and Exportation of Goods.*

Direction.	IMPORT.								EXPORT.								
	Bareilly.	*Pilibheet.*	*Newabgunj.*	*Doonka.*	*Jehanabad and Ritcha.*	*Fureedpoor.*	*Beesulpoor.*	*Total.*	*Bareilly.*	*Pilibheet.*	*Newabgunj.*	*Doonka.*	*Jehanabad and Ritcha.*	*Fureedpoor.*	*Beesulpoor.*	*Total.*	*Total of Import and Export.*
	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.	Mds.
South and East, ...	29,622	7,687	0	0	0	100	1	37,410	89,017	8,784	0	0	0	9,400	2	1,07,203	1,44,613
North-West,...	89,426	21,047	0	1,272	6,450	0	0	1,18,195	5,93,569	1,30,248	0	20,300	1,13,600	0	14,100	8,71,812	9,90,007
South-West,...	18,575	1,400	8,408	250	0	1,420	14,313	89,861	10,41,266	49,440	90,800	45,250	1,52,900	0	40,900	14,20,556	14,59,917
North, ...	41,390	20,892	0	168	500	0	20	62,970	0	0	0	0	0	0	0	0	62,970
Total ...	1,79,013	51,026	8,408	1,690	6,950	1,570	14,334	2,57,986	17,23,852	1,88,467	90,800	65,550	2,26,500	9,400	55,002	23,99,571	26,57,507

ANNEXURE V.—*Statement shewing the produce of the District, Consumption and Export.*

Cultivated area in Acres.	*Produce of each Acre at the Company's Seer of 80 Sicca Weight.*	*Total Produce.*	*Deduct seeds sown at the rate of 31 seers per Acre.*	*Balance.*	PRODUCE OF THE DISTRICT.		*Deduct husks of Paddy at 1-3rd of the entire produce.*	*Balance.*	CONSUMPTION OF THE DISTRICT.		*Balance.*	*Exported.*	*Stored.*
					A quarter Rice.	*Three-fourths other kind of produce.*			*Population.*	*Consumption.*			
10,56,961	20 maunds.	2,11,39,220	3,18,895	2,08,20,325	50,80,881	1,52,40,244	16,93,360	1,86,26,965	13,76,749	78,51,515; at the rate of ten chittacks per each soul.	1,07,75,450	23,99,573	83,75,877
										94,20,523, at 12 chittacks per soul.	92,06,442	23,99,573	68,06,869
										1,25,62,835 at 1 seer per soul.	60,64,130	23,99,578	36,64,557

Statement shewing the produce of the District, the share of Government, and the profit left to the Malgoozar.

Produce of the District, at 80 Company's Rs. per Seer.	*Average share of Government upon every 3 maunds.*	*Total share of the Government.*	*Neeruck per rupee of 80 Co.'s Rupees.*	*Value.*	*Government Jumma.*	*Profits of the Zemindar.*	REMARKS.
2,11,39,220	1 maund 2¼ seers.	71,34,480	2 maunds.	35,67,245 maunds.	17,91,242	17,76,003	

ANNEXURE VI.—No. III.—*From* J. STRACHEY, Esq., *Officiating Collector of Moradabad, to* R. ALEXANDER, Esq., *Commissioner of the Rohilkund Division, dated* 14*th April*, 1855.

I have the honor to acknowledge the receipt of your letters noted in the margin, regarding the construction of public works of unusual magnitude.

No. 151, dated 30th December, 1854.
No. 1, dated 1st January, 1855.
No. 11, dated 20th January, 1855.

2.—On this subject I can offer no suggestions which will possess any originality. Two great schemes have been suggested, the adoption of which would confer on Rohilkund or on some of its districts advantages the importance of which can hardly be exaggerated.

3.—One of them is a Canal which would leave the Ramgunga near Kalagurh at its exit from the Gurhwal hills, and run through the districts of Bijnour, Moradabad, and Budaon. The other is the Railroad through Rohilkund, which was the subject more particularly referred to in your letters now under acknowledgment. Both of these schemes are of high interest, but the latter seems to me to be by far the most important of the two.

4.—I have the honor to forward a note regarding the trade of the principal marts of this district, containing such information in reply to your enquiries as I have hitherto been able to collect. Even this amount of information, meagre as it actually is, has been obtained with considerable difficulty; and I am quite unable at the present time to furnish any satisfactory report regarding the statistics of trade in this district. Facts however are being collected by degrees. On all the more important lines of traffic, carts, camels, foot passengers, &c., are being regularly counted, and a valuable mass of information will I hope be the result.

5.—At present I am quite unable to give any analysis of the facts that might be derived from the returns that have already been received. I am indebted to Mr. Henry Thornhill, who until a short time ago was Joint Magistrate of this station, for the accompanying analysis of the returns of traffic entering and leaving Moradabad and Chundowsee for one week in January and February. The mass of figures is so great in the statements that have been received from the different places where counting carts, &c., has been going on, and the apparent results require to be so carefully tested, that I have found it impossible to send at present any additional returns.

6.—It will be seen from this specimen of the traffic returns that the actual amount of trade at Moradabad and Chundowsee is undoubtedly much larger than the notes which I have drawn up on the trade of the two places might lead one to suppose. The main reason of this appears to be, as I have mentioned in the notes themselves, that the information which I could get from merchants referred only to their own transactions. I

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believe that the amount of exports and imports which pass through the hands of the Moradabad and Chundowsee merchants is not very inaccurately given in my notes. The merchants have shown no unwillingness to give such information as their books could afford. Besides this there is the transit trade through both places; but regarding this the information that I received was evidently so untrustworthy that I have not attempted any speculations about it.

7.—Although I am not able to make any estimate of the actual traffic in tons that might be expected to pass over a railroad which should convey the produce of Rohilkund to the west, I think there is sufficient information, confessedly imperfect as it is, to authorize a confident opinion that such an undertaking would prove not only most advantageous to Rohilkund but very remunerative to its constructors.

8.—Cheap railroads seem peculiarly adapted to this part of India. Through the greater part of Rohilkund there is little *kunkur* to be found, and there is no other material available for metalling roads. Consequently the construction of really good roads, fit to carry a heavy traffic, is generally impossible except at an enormous expense. In this district there is not a single metalled road, nor can I see a probability of any being made. My experience of road-making in the plains has been so small that I can say nothing from my own knowledge; but if Colonel Cotton may be believed the average cost of a good metalled road in this country is not less than 5,000 rupees per mile. I believe that in this district it would probably much exceed this sum. The average cost of transit is now very great,—not less probably in the most favorable season than 1¼ anna per ton per mile; and as for three months of the year the roads may be considered almost impracticable for carts, the true average cost of transit for the year must be still higher. If this state of things could be easily amended by the construction of good common roads, it might perhaps be doubtful whether it would not be better to expend a large sum of money in making a great many miles of good common road than in making a comparatively few miles of railroad. But the difficulties in the way of making good metalled roads, fit to carry the traffic along the main lines of transit through Rohilkund, would be so great, and the expense of keeping up such roads when made would be so high, that I cannot doubt that it would be far better and far more economical in the end to construct a line of cheap railroad at once. The plan which I believe has been recommended by Captain Yule,—that the railroad should be adapted only for cattle draught,—seems to me to be a very judicious one. For my part, I entirely believe with Colonel Cotton that the thing wanted is "speed in forming communications, not speed in travelling upon them."

9.—The effect that the opening of the great line of railway from Calcutta to Delhi may have upon the trade of Rohilkund is a matter deserving the most serious consideration. I have no present means of

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forming any positive conclusions on the point, but I think it clear that the danger is no imaginary one, that the rice and sugar of Rohilkund may be superseded in the markets of the west by the produce of the country to the south, lying near the line of railway. If such a thing were to happen and its sole good market were to be lost, the results would be disastrous to Rohilkund. The proposed Rohilkund railroad would clearly be a complete preservation against any danger of the kind.

10.—There has I believe been a general agreement in the opinion of those best qualified to judge regarding the line that a railroad through Rohilkund ought to take. Supposing that no engineering difficulties forbid, the main line should apparently run from Shahjehanpore to Bareilly, and thence by Rampoor and Moradabad to Gurhmuktesur, or one of the neighbouring ghâts on the Ganges. A branch for the benefit of the Bijnour district should probably join the main line at Umroha, a town which, although it possesses at present no commercial importance, contained according to the last census 35,000 inhabitants.* In this case the mart at Dhunoura would be deserted, and its traffic would be brought to Umroha. Dhunoura is nothing more than a large village,† which during the cold season receives a temporary importance from the traffic which passes through it: its abandonment would be a matter of small importance to anyone. For the produce of Shahjehanpore and Bareilly the proposed line would be quite as convenient as one through Chundowsee, while to the Moradabad district the Chundowsee line would be of comparatively little use, and to the Bijnour district no use at all; Chundowsee would lose the importance which it now possesses, but this seems to be a matter of no great moment. There is nothing at Chundowsee which can make its possible abandonment a matter of regret. It is a mere entrepot, and has no intrinsic importance of its own. The exact point where the proposed railway should cross the Ganges seems to be a matter for the decision of the Engineer alone, and until the exact course of the great line from Calcutta be determined it is impossible to say where the Rohilkund railway should join it.

11.—For such further details as I can give regarding the trade of this district I beg to refer to the accompanying notes. I regret the delay that has occurred in sending my reply to your enquiries on this subject. Pressure of other work has made it impossible for me even now to attempt to furnish an answer such as the importance of the question deserves.

---

* The population of the three principal towns in this district was as follows:—

Moradabad, ...	57,414
Umroha, ...	35,284
Chundowsee, ...	23,274

† At the last census the population was 5,337.

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ANNEXURE VII.—*Notes regarding the Trade of the Moradabad district. By J. Strachey, Esq., Officiating Collector.*

1.—Rice and sugar are the two great articles of export from the Moradabad district. Their general destination is Bhewanee, in the district of Rohtuk,—the mart at which a very large part of the produce of Rohilkund collects, and whence it finds its way for consumption in Rajpootana. The great article of import is salt, brought also from Bhewanee on the other western marts.

2.—There are two main lines on which the traffic between this part of Rohilkund and the west is carried on. One of these goes to the Ganges at Gurhmooktesur and the neighbouring ghâts,* and thence through the Meerut district towards Delhi. The other goes through Chundowsee and crosses the Ganges at the Anoopshuhur or the neighbouring ghâts.

3.—The first of these lines carries the greater part of the exported produce of the Moradabad district, of the northern parts of Rampore, and of the western terai pergunnahs of Bareilly. The town of Moradabad is the centre of the traffic on this line.

4. The second, or Chundowsee line, carries the greater part of the exports from Bareilly and Pilibheet, the southern parts of Moradabad and Rampoor, and part of Budaon.

5.—Besides these two main lines, there is a third which must be mentioned. A large part of the sugar exported from Bijnour collects at Dhunoura, in the north-west corner of the Moradabad district, and crosses the Ganges *en route* to Delhi and Bhewanee at Sherpoor, or one of the ghâts above Gurhmuktesur. Dhunoura is a mart to which little produce except that of the Bijnour district finds its way.

6.—I shall endeavour to give a sketch of the nature of the trade that is carried on at the three marts of Moradabad, Chundowsee, and Dhunoura.

7.—*Moradabad (Exports).—Rice.*—The principal export from Moradabad is rice. The chief rice-producing country is that which lies between the hills and the Ramgunga. Much of this rice is very superior in quality to that produced in the more southerly parts of the district. Bansmuttee and Hunsraj are reputed the best. The finest rice of all is produced near the hills or in the lower ranges of the hills themselves. A great proportion of the rice from the pergunnahs of Thakoordwarah, Kasheepoor, and part of Moradabad, and from the northern parts of Rampore, collects in the first instance at Badlee Tandah, 15 miles from Moradabad on the road to Nynee Tal. The whole of this comes on to Moradabad, and a large quantity of rice also collects at Moradabad from Rampoor and other parts of this district. The business of collecting the rice at Badlee Tandah and other depôts between the hills and Moradabad is chiefly in the hands of *bun-*

* The actual place of crossing the Ganges in this and other cases varies according to the state of the river.

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jarahs. From enquiry from merchants at Moradabad, it appears probable that the average annual export of rice by the Moradabad traders may be as follows :—

From Badlee Tandah, &c.,...	...	...	1,00,000	Maunds.
From Rampore, &c.,	...	... ...	1,00,000	"
	Total,	...	2,00,000	Maunds.

Average cost at Moradabad, at 1½ rupee per maund, say Rs. 3,00,000. The greater part of the rice goes viâ Delhi to Bhewanee, and a considerable quantity to Bagput and Sonput. From Sonput, in the Paneeput district, I imagine this rice must go on towards the Punjaub. By far the greater portion of the rice is however destined for Delhi and Bhewanee. The whole of it crosses the Ganges at Gurhmuktesur. The average cost per maund to Bhewanee from Moradabad is 6 annas; and 4 annas and 5 annas to Bagput and Sonput. The distance from Moradabad to Bhewanee is about 180 miles; the rate per ton per mile is thus something more than 1 anna. The greater part of the rice is probably carried on carts, but a very large quantity is also carried by camels.

(*Exports*.)—*Sugar*.—Little sugar is collected in the town of Moradabad for export across the Ganges. Dhunoura and Chundowsee receive nearly the whole—Dhunoura being the great mart for the *goor* of Bijnour, and Chundowsee for the *khand* of Moradabad. The *goor* of this district is considered inferior to that of Bijnour, and the greater part of the sugar produced is exported as *khand*.

(*Exports*.)—*Cloth*.—A considerable quantity of coarse cotton cloth is manufactured in this district, coarse chintzes, durrees, and the various necessary articles of native dress. Moradabad itself is the head-quarters of the principal cloth merchants, and the quantity manufactured in the town is considerable. Large quantities are also made at Kant, and the manufacture goes on more or less throughout the district. The cloth-merchants of Kasheepore are of some importance, and through their hands the supply passes which is intended for the Kumaon hills. Cloths to the value of Rs. 2,00,000, or probably more, are sent every year from Moradabad to Furruckabad, viâ Chundowsee and the Soorujpore Ghât in Budaon. About Rs. 25,000 worth goes to Meerut and Delhi; Rs. 10,000 worth to Saharunpoor; Rs. 50,000 worth to Bareilly and Pilibheet; Rs. 50,000 worth to Kumaon; Rs. 10,000 worth to Muttra, &c.: total value of exports, say Rs. 3,50,000. This cloth is much heavier than the English and other cotton cloths imported from Furruckabad, of which I shall speak presently. The total weight of the above quantity may be 7,000 maunds. The ordinary rate of hire from Furruckabad is 8 annas per maund. The greater part of the cloth manufactured in the district is no doubt consumed at home, but I have no data which can enable me to estimate the proportion which this bears to the quantity exported.

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(*Exports.*)—*Borax.*—Nearly the whole of the borax brought from Thibet through the Kumaon and Gurhwal hills to Ramnugger or Chilkeea comes to Moradabad, and thence goes on to Furruckabad and Calcutta: nearly all of it is I imagine exported to England. It is difficult to say what is the average quantity brought down each year. This trade was formerly of much greater importance than it now is. The Thibetan borax has been almost superseded by that brought from the lagoons of Tuscany, and manufactured from boracic acid. During the last few years however the European demand has so enormously increased that the Italian supply, great as it is, has been insufficient, and the Thibetan borax again finds a ready market. If the hill people would take more pains with the refining process and the impurities were removed which now add to the weight and diminish the value of the salt, the borax trade might probably become one of some importance. The present average quantity annually exported through Moradabad has been stated to me as 15,000 maunds, but I do not place much reliance on these figures.

(*Exports.*)—*Drugs, &c.*—Drugs, dyes, spices, and condiments of various sorts are brought from the hills and the Kumaon Bhabur in large quantities. Besides the consumption of the Moradabad district—the extent of which I have at present no means of estimating—there is a considerable export to Furruckabad.

The total weight may be roughly guessed to be 20,000 maunds, and the value Rs. 80,000.

8.—There are no other exports of importance from Moradabad. The principal imports are the following :—

9.—(*Imports.*) *Salt.*—Three kinds of salt are imported; *1st, non, Sooltanpooree*, from Furrucknuggur (jhujur ?); *2nd, salumbha*, from Noh, in Goorgaon ; *3rd, sambhur*, from Bhewanee.

By far the greater part of the salt trade used until a few years ago to pass through Chundowsee, and that to Moradabad was comparatively insignificant; but during the last six or eight years the salt trade to Moradabad has been constantly increasing, and as far at least as the supply of this district is concerned the trade with Moradabad is probably larger than that with Chundowsee. This is attributed partly to mercantile failures at Chundowsee, but principally to fraud, by which the salt was systematically adulterated. This is said to have made the western merchants suspicious in their dealings with Chundowsee.

About 1,00,000* maunds of *non* and 40,000 maunds of *sambhur* are annually consigned to merchants at Moradabad. Not much *salumbha* is imported the whole of this is consumed in this district or in Rampoor except about 17,000 maunds sent to Kumaon. The supplies of salt to Bareilly and Budaon either go through Chundowsee or cross the Ganges at some of the

* The Seer of Rupees 80 is used for salt.

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ghâts lower down. The Moradabad salt all crosses at Gurhmuktesur. The average rate per maund of cart-hire from Moradabad to Furruknuggur is about 7 annas; to Noh 5¼ annas; to Bhewanee 6¼ annas, say 1¼ anna per ton per mile. The greater part of the salt is transported in carts, but the number of camels employed is also considerable. The average value of *non* at Moradabad is Rs. 3 per maund; of *salumbha* Rs. 2-10-0; of *sambhur* Rs. 4-8-0.

(*Imports.*)—*Cloth.*—Cloth, chiefly cotton, European and other is imported from Furruckabad into Moradabad to the value of about Rs. 3,00,000 annually. Of this about Rs. 75,000 worth goes to Kasheepoor, whence a considerable quantity finds its way to the hills; probably Rs. 50,000 worth goes to Budaon, and the rest is consumed in the Moradabad and Rampoor districts. The weight of the above may be 1,500 maunds. The whole of this cloth is carried in carts through Chundowsee, and crosses the Ganges at the Soorujpore ghât in Budaon.

In the dry season, the average rate of cart-hire from Furruckabad to Moradabad is 8 annas per maund;* but a considerable quantity of cloth is imported during the rainy season, because the thicker and warmer kinds of cloth are in demand before the rains are quite over, and at this time of year the rate per maund is one rupee. As the cold-weather supply is heavy, we may perhaps assume that the cloth has to pay an average rate of 12 annas per maund. The distance is about 120 miles. The rate per ton per mile is thus something more than two annas.

(*Imports.*)—*Iron.*—Not much iron comes to Moradabad direct. The great iron mart in this district is Chundowsee, and the chief supply is thence derived. The annual consignments from Furruckabad and Gwalior to Moradabad direct probably do not exceed 1,000 maunds. In addition to this there are some 500 maunds received from the hills.

(*Imports.*)—*Cotton.*—The import of cotton is insignificant. About 1,000 maunds come annually from Meerut and the neighbouring districts to Moradabad, *viâ* Gurhmuktesur.

(*Imports.*)—*Tobacco, Drugs, &c.*—The quantity of tobacco, drugs, spices, dyes, &c., imported into Moradabad annually from Furruckabad may be estimated at 50,000 maunds, and the value may be Rs. 2,00,000.

(*Imports.*)—*Copper and Iron Vessels.*—The annual import of copper and iron vessels for domestic purposes from Furruckabad to Moradabad are about 2,000 maunds, and the value may be 90,000 Rs.

10.—I have now noticed all the principal articles of import and export at Moradabad; but in addition to the quantities of each that I have given, and which are only those that are supposed to go through the hands of the merchants of the place, the transit trade though Moradabad belonging to merchants of other places has to be added, and the amount of this I cannot now estimate.

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* Seer of Rupees 105.

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11.—I proceed to speak of the trade of Chundowsee.

Chundowsee.—As a mart for the supply of the surrounding country Chundowsee is of less importance than Moradabad. Chundowsee is an entrepot through which passes a large part of the extensive traffic carried on between the Bareilly and Shahjehanpoor districts and the west. The account that I am going to give of Chundowsee will I hope be found not very incorrect as regards that part of the trade which passes through the hands of merchants of the place; but I have no means at present of estimating the transit traffic with which those merchants have no concern. When the traffic returns now under preparation are made up, satisfactory information on this point will I hope be forthcoming. Meanwhile the reports which have I imagine been received from Bareilly and Shahjehanpoor may to some extent supply the deficiency.

12.—According to the last census, Chundowsee contained a population of 35,000 inhabitants. There are few *pucka* buildings and the place looks like what it really is, a mere mart and entrepot, not a town which from its situation has any independent importance. The place is not one of any antiquity. Ibrahim Khan, a Pathan chief who lived about the middle of the last century, is said to have laid the foundation of its present trade by his exertions for the protection of merchants and the prohibition of exactions.

13.—The principal trade of Chundowsee is, like that of Moradabad, with Delhi and Bhewanee. The most frequented of the ghâts across the Ganges is probably that at Anoopshuhur; but this depends on circumstances, and the various ghâts up to Gurhmuktesur are used according to the state of the river and of the roads. There is also a considerable traffic by the ghâts of Anoopshuhur and Ramghat to Hattras and Muthra, *en route* to Agra, Bhurtpore, and the southern parts of Rajpootana.

14.—About 70,000 maunds of rice are annually exported by the merchants of Chundowsee. Of this one-third may come from Bareilly, one-third from Pilibheet, and one-third from Rampoor. The supply from the Moradabad district is trifling. The exports to Delhi and Bhewanee are about 47,000 maunds. The average cart hire per maund from Chundowsee to Bhewanee is eight annas. About 23,000 maunds are annually exported to Hattras and Muthra. The average hire per maund is four annas to Muthra. The greater part of the trade is carried on in carts. The trade in rice at Chundowsee is thus small when compared to that of Moradabad. Besides this, there is, as I have above stated, the transit trade from Bareilly and Shahjehanpoor, which I have no means of estimating.

(*Exports*)—*Sugar.*—In sugar, the Chundowsee trade is more important. The pergunnah of Billaree, in which Chundowsee is situated, produces a large quantity of sugar, and Chundowsee is the head quarters of the sugar trade of the Moradabad district. The sugar is exported in three forms; 1*st*, *khand;* 2nd, *lall shukkur;* 3rd, *goor.*

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The following is an approximation to the quantity of each received and exported annually by the merchants of Chundowsee:—

1st.—*Khand*, received annually at Chundowsee, produce of

Moradabad district,	... ...	32,000 Maunds*.
Ditto ditto Bareilly and Pilibheet,	... ...	6,000 „
Ditto ditto Budaon (Bilsee, &c.),	... ...	8,000 „
Ditto ditto Rampoor, ...	... ...	10,000 „
Total,	... ...	56,000 Maunds.

Average cost of Chundowsee, Rs. 6 per maund. Total value of annual export of *khand*, say Rs. 3,36,000.

Of the above about 8,000 maunds are consumed in this district, and the rest is exported as follows:—

To Bhewanee,	... ...	30,000 Maunds.
„ Muthra, ...	... ...	10,000 „
„ Rewaree, Delhi, Meerut,	... ...	8,000 „
Total Exports of Khand, ...		48,000 Maunds.

The cart-hire to Bhewanee averages eight annas per maund; to Muthra four annas; to Rewaree six annas.

2nd.—*Lall shukkur*.—Of this about 50,000 maunds have come annually to Chundowsee for several years past. Nearly the whole of this supply comes from the Bijnour district, and the greater part is re-exported to the west. This is a very circuitous route for sugar to take from Nugeena to Bhewanee. The reason is said to be that the harvests for some time past have been bad in Bijnour, and this sugar comes to Chundowsee in return for grain. This trade did not formerly exist, and may be expected to cease with the circumstances which caused its origin. Of the above quantity there is expended in this district about 16,000 maunds; about 2,000 maunds go to Budaon; and the rest, 32,000 maunds, goes to Bhewanee.

The average value per maund of *lall shukkur* at Chundowsee is Rs. 2¼; the rate of cart-hire is the same as for *khand*.

3rd.—*Goor*.—The greater part of the supply comes from the Rampoor jagheer. The Billaree sugar is almost all made into *khand*.

The average annual quantity of *goor* collected by the Chundowsee merchants is said to be as follows:—

From Rampore,	... ...	60,000 Maunds.
„ Bareilly,	... ...	10,000 „
„ Jusspore, Thakoordwara, and other parts of the Moradabad district,	... ...	10,000 „
Total,	...	80,000 Maunds.

* Seer of 96 Rupees used for khand.

The average value per maund is one rupee twelve annas.

Of this about 20,000 maunds are sold for consumption in this district, and the remaining 60,000 maunds are exported across the Ganges: the greater part goes to Bhewanee and Delhi.

The average rate of cart-hire from Chundowsee to Bhewanee for *goor* is 10 annas per maund; to Agra 6 annas; to Muttra 5 annas.

A great proportion of the sugar exported goes in the returning carts which come with salt from the west.

(*Exports.*)—*Cloth.*—Very little of the cotton cloth manufactured in the district is exported from Chundowsee, but a considerable quantity is brought in for sale on the spot. The annual value of this has been stated to me to be about 50,000 rupees.

(*Exports.*)—*Borax.*—About 1,200 maunds only are annually consigned to Chundowsee merchants. All this goes to Furruckabad. The average cart-hire to Furruckabad is 5¼ annas per maund.

(*Exports.*)—*Drugs, &c.*—The quantity exported from Chundowsee is much smaller than that given above as the probable export from Moradabad. It does not perhaps exceed 1,200 maunds, and the value may be Rs. 4,800. About half of this may go to Furruckabad, and the rest is consumed in this district.

(*Exports.*)—*Cotton.*—About 15,000 maunds of cotton, the produce for the most part of the neighbouring pergunnahs of Billaree and Sumbhul, come annually to Chundowsee. Of this about 2,000 maunds are consumed at or near Chundowsee; 1,000 maunds go to Furruckabad, viâ Soorujpoor Ghât; and the remaining 12,000 maunds to Kesrigunj, Oudh, viâ Bareilly. The ordinary value of this cotton at Chundowsee is about Rs. 8 per maund. The cart-hire to Kesrigunj is 10 annas per maund.

(*Imports.*)—*Salt.*—15. The three kinds of salt that I have mentioned when speaking of the Moradabad trade are imported into Chundowsee. As I have before stated, the salt trade of Chundowsee has much fallen off of late years, and it is now inferior to that of Moradabad. Of the three kinds of salt the following may give some idea of the quantity annually imported:—

1*st.*—*Non, Sooltanpore*, 62,000 maunds. This comes from Furrucknuggur. The ordinary value is Rs. 3 per maund at Chundowsee. Total value of annual imports, Rs. 1,86,000. The average rate of cart-hire from Chundowsee to Furrucknuggur is 7 annas per maund. Of the above quantity something less than half comes by the Gurhmuktesur Ghât, and the rest by Pooth, Ahar, and Anoopshuhur.

2*nd.*—*Salumbha*, from Noh, Goorgaon, 18,000 maunds; average value per maund, Rs. 2-10-0. Total value of imports, Rs. 47,500. The greater part of this comes by the Anoopshuhur Ghât. The average rate of cart-hire to Noh is 5¼ annas per maund.

3*rd.*—*Sambhur*, from Bhewanee, 12,200 maunds. Ordinary value at Chundowsee, Rs. 4-8-0 per maund. Total value of imports, Rs. 54,900.

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The average rate of cart-hire to Bhewanee is 6¼ annas per maund. About half of this comes by Gurhmuktesur, and half by Anoopshuhur.

The total of the three kinds of salt annually imported by the Chundowsee merchants is thus 92,200 maunds, and the value about Rupees 2,88,400.

About a third of this salt goes to Budaon, Bilsee, Suheswan, &c., say 31,000 maunds; to Aonlah, Fyzgunj, Bareilly and Shahjehanpoor, 20,000 maunds; to Serowlee and the western parts of Bareilly, 10,000 maunds; to Rampoor jagheer, 3,000 maunds; consumed in the Moradabad district, 28,200 maunds. In addition to all this there is of course the supply which may be consigned direct to merchants at Bareilly, Shahjehanpoor, &c., from the west. The salt trade at Chundowsee is in the hands of about twelve merchants. To them the original consignments are made, and they act as brokers between the western merchants and the Rohilkund dealers.

(Imports.)—Cloth.—Cloth is imported from Furruckabad by the Soorujpoor Ghât, to the average annual value of Rs. 1,00,000. The weight of this probably does not exceed 800 maunds. Nearly the whole of this is either consumed on the spot or is sent from Chundowsee to Rampoor, Kasheepoor, Sumbhul, Umroha, and the other towns of this district.

(Imports.)—Iron.—The annual imports of iron by the merchants of Chundowsee are estimated as follows:—

	Maunds.
From Furruckabad, ...	10,000
„ Beejawur, ...	1,500
„ Gwalior, ...	10,000
„ Mungrowlee, ...	1,000
„ Hatras, ...	5,000
„ Hulsooagunj, ...	2,500
Total, ...	30,000
Total value, at say Rupees 5 per maund, ...	Rs. 1,50,000

The average rates of cart-hire per maund are as follows :—

From Furruckabad, ...	7	Annas.
„ Beejawur, ...	1¼	Rupee.
„ Gwalior (by Ramghat,)	1	Rupee.
„ Mungrowlee, ...	1¼	Rupee.
„ Hattras, ...	4	Annas.
„ Huldooagunj (by Ramghat),... ...	4	Annas.

I am not able to state the quantity of each description of iron according to the place where it was originally produced.

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The i..n thus imported is said to be disposed of as follows:—

To Rampoor (by Seondarah), ...	2,000	Maunds.
" Nugeenah and Nujeebabad (by Moradabad),	4,000	"
" Moradabad, Hussunpoor, Sumbhul, &c., ...	4,000	"
Budaon, ...	200	"
Consumed at Chundowsee and neighbourhood,	18,800	"
	———	"
Total, ...	29,000	Maunds.

The great traffic of carts through Chundowsee causes this considerable consumption of iron. The trade of wheelwright is one of the most flourishing in the place.

(Imports.)—Tobacco, Drugs, &c.—About Rs. 60,000 worth of tobacco, spices, drugs, &c., are annually imported from Furruckabad. The weight may be estimated at 6,000 maunds. The greater part of this is consumed in the neighbouring parts of the Moradabad district.

About Rs. 3,000 worth of Hill and Bhabur drugs, dyes, &c., come from Pilibheet, viâ Bareilly, say 400 maunds; and about Rs. 12,000 worth of various kinds of "kerana" come from Delhi and Hatras, in weight say 12,000 maunds. These quantities imported are so small that it seems unnecessary to give further detail. The greater part is consumed on the spot or in the neighbourhood.

(Imports.)—Copper and Iron Vessels.—These are imported for local consumption from Furruckabad, but the quantity is trifling.

(Imports.)—Tat-puttee.—Of tat-puttee about 3,000 maunds, value say Rs. 15,000, are imported annually into Chundowsee; two-thirds come from Bareilly and one-third from Budaon. This is extensively used for sacks, &c., for sugar and other articles of export.

16.—Both to Moradabad and Chundowsee there is a considerable quantity of timber brought from the forests at the foot of the Kumaon hills. Nearly the whole is consumed within the district, and I am not able to give any estimate at present of the quantity.

Dhunoura.—17. Dhunoura is almost entirely a mart for the export of the sugar of Bijnour. Little of the produce of this district goes there. The Dhunoura merchants have stated that their average annual exports of the principal articles of Bijnour produce are as follows:—

Lal Shukkur and Goor, ...	2,00,000	Maunds.
Khand, ...	4,000	"

The sugar has for the most part the same destination as that exported from Moradabad and Chundowsee, Delhi and Bhewanee. The imports into Dhunoura are small. About 30,000 maunds of Sambhur salt come annually from Bhewanee, and about 4,000 maunds of cotton from Meerut. The traffic to and from Dhunoura crosses the Ganges at Sherpore or some one of the other ghâts between that and Gurhmuktesur.

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ANNEXURE VIII.—No. IV.—*From* C. J. WINGFIELD, ESQ., *Collector of Bijnour, to* R. ALEXANDER, ESQ., *Officiating Commissioner of Rohilkund Division, Bareilly, No.* 72, *dated* 20*th February*, 1855.

1*st.*—I have the honour to forward my report on the trade of this district, and begin by answering categorically the questions put in your letter No. 1, 1st January, 1855.

I.—Nujeebabad, Keerutpore, Nugeena, Dhampore, Huldour.

II.—At Nujeebabad, from Kotdwar and the hills, and from the surrounding villages of pergunnah distant from eight to ten miles. At Keerutpore, Nugeena, Dhampore, Huldour, from the neighbouring villages.

III.—*Nujeebabad*, within the province of Rohilkund. The direction of trade is towards Dhunoura and Chundowsee, principally to the former across the Ganges; its destination is to the great marts of Bhewanee, Shamlee, Rewaree, Delhi; also of a small proportion to Seharunpore and Umballa.

Keerutpore.—The same direction as that from Nujeebabad.

Nugeena.—Within the province of Rohilkund, Dhunoura and Chundowsee, across the Ganges, Bhagput, Bhewanee, Rewaree, Kerea, Hattras, Shamlee, Delhi, Meeranpore.

Dhampore.—The trade from this town takes the same direction both within and beyond the Ganges as that of Nugeena.

Huldour.—The same direction as from the above-named towns.

IV.—From *Nujeebabad* for the most part at Daranuggur, a small proportion at Raolee, and still less at Asofgurh.

From *Keerutpore* at Daranuggur, and a small proportion at Raolee.

From *Nugeena* at the same points as the trade from Keerutpore.

From *Dhampore* at Daranuggur.

From *Huldour* at Daranuggur.

V.—This has been answered in my replies to question III.

VI.—Nujeebabad sugar (drugs, spices, from Kotdwar and the Hills), coarse cloth (garah), cotton prints, brass vessels.

Quantity sent by parties engaged in trade, either as members of mercantile houses established at Nujeebabad or as agents for western houses, ...	26,000	Maunds.
The whole of this goes across the Ganges :—		
Quantity supposed to be sent direct by the zemindars and wealthier cultivators, ...	20,000	„
Of this about 8,000 maunds go to Dhunoura, the rest across the Ganges.		
Total trade, ...	46,000	Maunds.
Crosses Ganges, ...	38,000	„
Does not leave Rohilkund, ...	8,000	„

Keerutpore sugars (of the finest description).

Quantity sent by the commercial houses settled at Keerutpore, or bought up by agents for transmission to the western marts, ...	10,000	Maunds.
The whole of this crosses the Ganges.		
Supposed to be sent direct to market by the zemindars and cultivators,...	15,000	"
Of this, 10,000 maunds is supposed to cross the Ganges.		
Total trade, ...	25,000	Maunds
Goes across Ganges, ...	20,000	"
Does not leave Rohilkund, ...	5,000	"

The pergunnah of Keerutpore produces the finest sugar-cane in the district, of which the greater part is manufactured into *khand*.

Nugeena sugars, rice, hemp, coarse cloth (garah), printed cottons, coarse rope of grass (babur), spices.

Quantity sent by the merchants of Nugeena, and by the agents employed to make purchases for the western houses, ...	40,000	Maunds.
Of this one-half, or 20,000 maunds, is supposed to cross the Ganges.		
Quantity sent to market by the zemindars themselves, or bought up for export by the bunjarahs, jojurs, (whose dealings lie exclusively in rice), ...	80,000	Maunds.
Of this one half is supposed to cross the Ganges.		
Total trade, ...	1,20,000	"
Crosses Ganges, ...	60 000	"
Does not leave Rohilkund, ...	60,000	"

2*nd*.—The pergunnahs of Nugeena and Ufzulgurh, but especially the latter, produce rice of a good quality. The regular merchants do little business in rice; the trade is almost entirely carried on by bunjarahs, who are supposed to take away 30,000 maunds annually.

The *sunny* plant is also much cultivated in Ufzulgurh for its hemp, and the *tat* made from that hemp; the exports of both these articles are calculated at 20,000 maunds a year.

Of drugs and spices at 3,000 maunds.

Dhampore.—Sugar; rice.

Quantity sent by the members of trading firms settled at Dhampore, ...	10,000	Maunds.
Nearly the whole of this is sent to Dhunoura; *i. e.*, it remains in Rohilkund.		
Quantity supposed to be sent by the zemindars and cultivators, or purchased in the villages by the bunjarahs and jojurs,...	40,000	Maunds.

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Of this the entire proportion of rice, which is estimated at 15,000 maunds, crosses the Ganges.

Total trade, ...	50,000	Maunds.
Crosses Ganges, ...	15,000	,,
Does not leave Rohilkund, ...	35,000	,,

3rd.—I have assumed the trade of this town at double the amount entered in the traders' accounts for the past commercial year, for the *khurreef* crops of 1853 were ruined by droughts, and the produce must have been less than half of the yield in an ordinary season.

Huldour.—Sugar; rice.

Quantity that passes through the hands of parties engaged in trade, ... 20,000 Maunds.

Of this one half, or 10,000 maunds, crosses the Ganges.

Quantity sent direct to market by zemindars and cultivators, or purchased by bunjarahs and jojurs, ... 40,000 Maunds.

Of this 10,000 maunds is supposed to cross the Ganges.

Total trade, ...	60,000	Maunds.
Crosses Ganges, ...	20,000	,,
Remains in Rohilkund, ...	40,000	,,
Grand Total quantity of Exports, ...	3,01,000	,,
Sent by regular merchants and houses of business, ...	1,06,000	,,
Sent direct by agriculturists, ...	1,95,000	,,
Crosses Ganges, ...	1,53,000	,,
Sent to marts in other districts of Rohilkund,	1,48,000	,,

VII.—The traffic is carried on by means of carts, camels, bullocks, ponies, and mules, but the bunjarahs and jojurs only make use of the latter modes of conveyance. The merchants almost invariably send their goods in hackeries; though as in the case of the Rewaree traders camels may be occasionally employed. There is no means of ascertaining what the charge for carriage by bullocks and mules amounts to; I have therefore only attempted to show the cost by carts.

From Nujeebabad to Bhewanee and Rewaree,	Rs.	30	per 100	Maunds.
Delhi, ...	,,	28	,,	,,
Dhunoura, ...	,,	11	,,	,,
From Nugeena to Bhewanee, ...	,,	35	,,	,,
Shamlee, ...	,,	20	,,	,,
Delhi, ...	,,	25	,,	,,
Meerut, ...	,,	15	,,	,,
Dhunoura, ...	,,	12-8	,,	,,
Chundowsee, ...	,,	15	,,	,,
From Keerutpoor to Bhewanee and Rewaree,	,,	53	,,	,,
Shamlee, ...	,,	31	,,	,,
Delhi, ...	,,	37	,,	,,

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From Dhampoor to Baghput, ...	Rs. 25	per 100 Maunds.	
Bhewanee and Rewaree, ...	„ 50	„	„
Delhi, ...	„ 30	„	„
Dhunoura, ...	„ 8	„	„
From Huldour to Bhewanee and Rewaree, ...	„ 50	„	„
Hatrass, ...	„ 12	„	„
Shamlee, ...	„ 40	„	„
Delhi, ...	„ 30	„	„
Meeranpoor, ...	„ 35	„	„
Dhunoura, ...	„ 12	„	„

4th.—I have entered the cost as given by the merchants at the several marts; but I am convinced that in two instances they have intentionally understated it, with the idea that Government would charge them no more for the carriage of their goods by railway than they paid at present, and therefore they had a direct interest in making that appear as low as possible.

5th.—I have since ascertained from persons engaged in trade and others that the regular charge for carriage by carts is one anna per maund for each "*munzil,*" or stage of twelve coss, and though laden carts cannot get over that distance in one day, the time occupied by the journey is not taken into consideration. Moreover, the number of stages to any given point is the same from all the emporia of the district. It is no greater from Nugeena than from Huldour, as in a journey to Bhewanee the difference is scarcely perceptible. I give the recognized number of "*munzil*" to each of the following places, and the cost of carriage of 100 maunds at one anna per *munzil.*

	Munzils.	*Cost per* 100 *Maunds.*
To Bhewanee and Rewaree, ...	8	Rs. 50
„ Delhi, ...	5	„ 32
„ Hatrass, ...	6	„ 38
„ Korie, ...	8	„ 50

This calculation shows that the cost of carriage was correctly stated by the merchants of Keerutpoor, Dhampoor and Huldour, and proves that it was designedly misrepresented by those of Nujeebabad and Nugeena. I have sought for accurate information on this point, because I learnt that Captain Yule had been led by the same interested parties to imagine that carriage to Bhewanee cost them only five annas a maund; whereas including ferries and tolls it must come to nearly double.

VIII.—Salt 50,000; iron 20,000; oil 10,000; kanch (potash for making glass) 5,000; cotton and grain; but it is impossible to form any correct estimate of the amount of the two last-named articles annually imported, as the demand is fluctuating as is regulated by the price of the markets on either side of the Ganges. In 1853 the *rubbee* harvest having utterly failed, it is probable that 20,00,000 maunds of grain were imported in this

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district. This year it is more likely that there will be an export: as a general rule, however, wheat of the finer quality is always imported.

6th.—Excepting Nujeebabad and Nugeena—and it is doubtful how far these answer that description—there are no great marts in this district, whither the produce of the surrounding country is brought from long distances. In naming therefore the emporia after these two most deserving of mention, I have some difficulty in making the selection. Were I to descend low in the scale, I should take in places that answer to little more than English market towns; and yet there is probably no town of any pretension to rank above a village that does not number among its population one or more small traders, who annually send a few cart-loads of produce to Dhunoura.

7th.—But a very inadequate idea of the trade of this district would be formed if only so much as passed through the hands of the mercantile community were taken into consideration, and a reference therefore to commercial accounts affords but small aid in this enquiry. I have endeavoured to ascertain from merchants, zemindars and others, the quantity of produce sent direct to the Moradabad markets by the agriculturists themselves, or bought of them by bunjarahs, koombhars and jojurs. The result is exhibited in my answers to question six; but this estimate is only for the pergunnahs in or near which are situated the five emporia enumerated. The sugar and rice similarly disposed of by the zemindars of Chandpoor, Noorpoor, Nethour and Sehora is not taken into account. The quantity must be very large, for as we approach Dhunoura and Chundowsee, the trade gets more and more out of the hands of the merchants, and is carried on by the agriculturists themselves—every man who possesses a cart and oxen, and who is not a slave to the money-lenders, availing himself of that means of disposing of the productions of the soil. Some of the great zemindars keep up a large establishment of carriage for the same purpose.

8th.—It is impossible to arrive with any degree of accuracy at an estimate of the produce thus exported. That can only be done by taking the tale of the cart and laden animals at certain points, which is in course of execution. Such rude calculations as I have formed would lead me to the conclusion that four-fifths of the trade is conducted by the agricultural population (and among them I include the bunjarahs and others who possess mules and tattoos), without the intervention of the mercantile classes.

9th.—My calculation, it will be seen, corresponds pretty nearly with that of Chowdhree Pertab Singh, a very intelligent and wealthy zemindar, himself largely embarked in trade, who estimates the exports of this district at 6,00,000 maunds. But whatever it may be now, it is but reasonable to expect it will increase largely with the stimulous to production that improved communications would give.

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10th.—Perhaps a brief description of the mode in which, and the class of persons by whom, the trade is carried on at Nujeebabad and Nugeena may not prove uninteresting or uninstructive.

11th.—At Nujeebabad the leading commercial firms are correspondents of the mercantile houses of Bhewanee, Rewaree and other western marts, and their dealings are regulated on the principles that ordinarily govern such establishments. There is no intercourse on their part with Dhunoura or Chundowsee. They are not dependent for the transmission of their merchandise on the arrival of the carts laden with salt from the west, but despatch it whenever prices present a favorable opportunity for investment.

12th.—At Nugeena, on the other hand, there are no houses that are in correspondence with the western trading establishments, and but few wealthy merchants. The trade is mostly in the hands of the *arthees* or brokers, who repair to Nugeena at the commencement of every cold season, to make purchases for their employers at the western marts. They act also as commission agents for the sale of agricultural produce, which is deposited with them by the zemindars. They buy as they receive instructions from their principals, or at their own discretion, as they see a favorable occasion, the zemindars paying them a percentage on each sale. The Dhunoura houses have likewise correspondents, and also agents at Nugeena, who make purchases direct of the villagers. These *arthees* had no books to show they said, and I believe truly, for it seems natural that they were merely brokers employed to make purchases by others by whom the accounts of all such transactions were kept.

13th.—It is clear then to me that the trade in the hands of the commercial classes forms but a small part of the traffic of the country which may be relied on to yield a profitable return on the capital expended on a line of railway. The railways in England are not dependent entirely on the towns or seaports; how much of their traffic consists of farm produce, cattle, hay sent by the farmers themselves; and to such articles sugar and rice occupy a corresponding position here. The effects of a railway in this district would I believe be to render the agriculturists less dependant on the local traders and money-lenders, by enabling them to convert the produce of their lands into money at a slight cost and in a few hours, or even to send it long distances to markets that offer a better price, which all but the wealthy who keep up carriage for the purpose are at present debarred from doing.

14th.—The trade between Daranuggur and Mirzapore and Patna may be fairly assumed at 1,00,000 maunds annually; and one of the wealthiest merchants of that place, whose transactions are to the extent of 40,000 maunds annually, informs me that were a railway to run from Moradabad to meet the Grand Trunk line to Delhi, the traffic now carried on by means of the Ganges would at once be transferred to the railway—for

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boats are a tedious, dangerous and extensive mode of transport. The trade of Daranuggur may then be reckoned on for the support of a railway; but with a railway the commercial importance of Daranuggur will disappear. It is not a depôt for the produce of this district,—the trade merely crosses at the ghât.

15*th*.—There is another consideration which, though it does not strictly enter into the present enquiry, should not however be left out of view in estimating the profit to be derived from such an undertaking. The assessment of this district, or at least of many of the pergunnahs, was based at last settlement on the prices of sugar, of which Rohilkund then enjoyed almost the monopoly of production. They were then naturally high, but since that time large tracts in the Doab have been brought under sugar cultivation, and prices have fallen considerably. Now if there is a railway to convey the sugar of Ghazeepore and Azimgurh to Agra, and it is raised there I understand at less cost than it is here, and another railway for the sugar-producing districts of Moradabad and Bareilly, to meet the Delhi line, while this district is left without any improved means of communication—for there is no metal even for existing roads—it is clear that it will be placed under great disadvantages, and will be quite unable to compete with other parts of Rohilkund, and that it will then become a matter of doubt whether the present high rate of assessment can be maintained.

16*th*.—I presume that any branch railway contemplated for this district would make Nujeebabad its terminus, and run thence by Nugeena and perhaps Dhampoor, to join the line for Moradabad across the Ganges. But it strikes me that it is of less importance what existing entrepôts of trade the railway may pass near, provided it traverses the heart of a producing country. Railways here will doubtless have the same effect as in England, of causing towns of former commercial importance to decline and new ones to rise in their place. The means of communication hitherto existing have determined the choice of the positions now occupied by trade; these will change with the altered modes of transport The produce of the surrounding country now collects at Chundowsee and Dhunoura,—not to furnish the staple for any great branch of manufacture seated there or for local consumption, but merely to be sold for transmission elsewhere. The utility of such intermediate marts must cease when the produce can reach the railway at any one of the numerous stations along the line.

17*th*.—I explained to the merchants of Nujeebabad, Keerutpoor and others the object to which my enquiries on the state of trade were directed, and I think I completely succeeded in convincing them that the suspicions which as I was informed they had been led to entertain of the intentions of Government were entirely unfounded. They gave every information their books could afford, and when they said they had none to show I believe they spoke the truth.

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18th.—I cannot conclude this report without recording my opinion that the inadequate time allowed for its prepara io should absolve me from all blame for any inaccuracies that may hereafter be detected in it. Independently of the obstructions interposed by the intense stupidity of two of the Tehseeldars (Chandpoor and Dhampoor), who could not, though a most clear and careful translation was made of your letter, be brought to understand what was required of them, the enquiry itself is of a nature that especially requires time and consideration. Answers to set questions can no doubt be quickly obtained, but until they have been closely examined, and tested by personal observation and information derived from candid and disinterested persons, it would be unsafe to promulgate them in the form of statistics. Nevertheless your demands for the transmission of the report were so urgent that I did not feel myself at liberty to delay it any longer, in the hopes of making it more complete and trustworthy.

ANNEXURE IX.—No. V.—*From* M. Ricketts, Esq., *Officiating Collector of Shahjehanpoor, to* R. Alexander, Esq., *Officiating Commissioner of Rohilkund, No.* 27, *dated the* 12*th January*, 1855.

I beg to reply as follows to the several questions of your Circular letter No. 1, dated the 1st instant.

To question No. 1.—The city of Shahjehanpoor and the town of Tilhur are the principal emporia of trade in this district.

To question 2nd.—At Shahjehanpoor the articles of trade collect from a distance of about 100 miles from Oude, from the north and neighbouring parts of the district, and from Hattras and Muttra and Agra. Tilhur is a smaller provincial market, and the imports are gathered in principally from the surrounding parts of the district, or from Pilibheet.

To questions 3rd and 5th.—Within the province of Rohilkund the trade flows to Chundowsee ; and without, takes the direction of Agra, Muttra, Gwalior, of that of Delhi and Rajpootana, or Punjaubwards.

To question 4th.—The trade of the Agra direction crosses the Ganges at the Ghuttoca ghât, or at the Koochla ghât, in the Budaon district, and the western exports issue at Gurhmuktesur.

To question 6th, 7th and 8th.—My answer to these questions may be very inaccurate, as it is only derived from the rough guess work of brokers, and it does not include the Tilhur articles of trade. I cannot give even an approximation of the proportions specified in your letter.

Imports into the town of Shahjehanpoor, roughly estimated.

	Maunds.		Valued at
Ghee, from the Gwalior side, ...	7,000	Rs.	75,000
Cotton, from ditto, ...	30,000	„	2,11,000
Iron, from ditto, ...	70,000	„	21,00,000
Salt, from ditto, ...	1,50,000	„	40,00,000
Sambhur Salt, from Jeypoor, ...	200	„	900

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	Maunds.		Valued at
Saffron, from Oude, or through the north of the district, ...	10,000	Rs.	20,000
Kutta, from Oude, ...	200	„	1,000
Grass, to be manufactured into ropes, from Oude and north of district, ...	10,000	„	10,000
Mastic, from Oude, ...	200	„	600
Lac, from Oude, ...	200	„	1,000
English Cloths and Cloths from Futtehgurh,	{ Quantity unknown. About }	„	1,00,000
Spices, from Futtehgurh, ...	„	„	10,000
Cloths, from Bareilly and Moradabad, ...	.... „	„	10,000
Vessels of Brass and Iron, from Futtehgurh,	... „	„	20,000
English Iron and English Thread, from Futtehgurh, ...	10,000	„	10,000

Exports.

Goor, sent to the Gwalior side and to the westward, ...	30,000	Rs.	3,00,000
Sugar sent to Gwalior and to Delhi, ...	75,000	„	50,00,000
Molasses to ditto and to Oude, ...	50,000	„	30,000
Rice, wheat and other grains to ditto, ...	50,000	„	50,000
Saffron sent to Cawnpoor, Etawah, &c.,...	5,000	„	10,000
Kutta, Etawah, &c.,...	100	„	500
Seenk, ditto and Oude, on to Jeypore, ...	5,000	„	5,000
Cloth, Jhola, to ditto ditto, ...	{ Quantity unknown. }	„	20,000

To question 8th.—Carts are usually employed for carriage, and the cost of carriage by cart from Shahjehanpoor to the Ghutteea Ghât on the Ganges is four annas per maund. I cannot give the total cost to the other ghâts, but the rate is half an anna per maund per 3½ coss, equal to about six miles. In addition to the above, grain produced in the south of the district to the amount of about 75,000 maunds is exported viâ Julalabad to Cawnpoor and Agra. The Deputy Consulting Engineer has asked me for a return of traffic at the Shahjehanpoor Bridge, where the Bareilly and Futtehgurh roads meet, and I propose to send it to him with all possible despatch.

No. VI.—*From* R. H. S. Campbell, Esq., *Collector of Budaon, to* R. Alexander, Esq., *Officiating Commissioner of Rohilkund, dated the 17th February,* 1855.

In reply to your Circular letter No. 1, of the 1st ultimo, I have the honour to submit the information called for by you on the particular points mentioned in your letter.

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I.—Name the principal emporia in your district at which produce or manufacture for trade and export collects.

I.—Bilsee, Oojheanee, Kukralah, Datagunge, Ussudpore, Oosaith and Gunwan.

II.—From what direction and distance does the trade at each of such emporia collect?

II.—

Bareilly, ...	44	Miles.
Shahjehanpore,	72	„
Mynpooree, ...	65	„
Furruckabad, ...	70	„
Calcutta, ...	800	„
Hatras, ...	110	„
Gwalior, ...	240	„
Moradabad, ...	40	„
Allygurh, ...	95	„

III.—What direction does the trade from each of these emporia take, both within the Province of Rohilkund and without?

III.—Chiefly in the direction of Cawnpore, Furruckabad, Mirzapore and Calcutta, out of Rohilkund; and to Chundowsee within Rohilcund.

IV.—At what point does trade from each of these emporia reach the Ganges?

IV.—

Kuchlah.	Dhampore.
Kadir Chouk.	Hosainpore.
Ram Ghât.	Bhudroul.
Chaoopore.	NunaKherah.

V.—What is its ultimate destination after crossing the Ganges?

V.—

Cawnpore.	Allygurh.
Furruckabad.	Agra.
Mynpooree.	Delhi.
Hatras.	Calcutta.

VI.—Specify the articles of trade from each of such emporia, and the quantity distinguishing, if practicable, the proportion which does not leave Rohilkund and that which is intended to cross the Ganges.

VI.—Corn, Cotton, Goor, Shera, &c., Indigo, coarse Native Chintz. Probable quantity which crosses the Ganges:—

Corn, ...	3,00,000	Maunds.
Cotton, ...	1,00,000	„
Goor, &c.,	1,00,000	„
Indigo, ...	800	„

Probable quantity which does not leave Rohilkund:—

Corn, ...	2,00,000	Maunds.
Cotton, ...	1,00,000	„
Goor, &c.,	15,000	„
Indigo, ...	200	„

VII.—Specify the kind and cost of carriage from each emporia to the point at which it crosses the Ganges, or to its destination, express-

VII.—Country carts are used to convey the articles of trade to the river Ganges, the rate of hire varying from Rs. 2-4-6 to Rs. 10 per 100

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ing that cost by the rate per maund or per 100 maunds.	maunds. From the river to Hatrass, 25 rupees per 100 maunds. From the river to Chundowsee, 18 rupees per 100 maunds. From the river Ganges country boats are used, the hire of which to Cawnpore varies from Rs. 10 15-0 to Rs. 20 per 100 maunds; to Mirzapore Rs. 30 per 100 maunds; to Benares Rs. 32 per 100 maunds.
VIII.—Specify the return received from the other side of the Ganges, both as to kind and quantity.	VIII.—From Hattrass, Allygurh, Calcutta:— Ghee, about ... 50,000 Maunds. Salt, ... 35,000 „ Native Iron, ... 30,000 „ Tobacco, ... 2,000 „ From Furruckabad,—Cloth, about two lacs of rupees' worth. Copper and Brass pots,... 12,000 Maunds. Groceries, ... 50,000 „ English Iron,... 50,000 „

No. VII.—From W. Muir, Esq., *Secretary to Government, North-Western Provinces*, to Captain H. Yule, *Deputy Consulting Engineer to the Government of India, No.* 1622 *A., Public Works Department, dated Head-quarters, Nynee Tal, the* 15*th August*, 1855.

I am desired to acknowledge the receipt of your letter dated the 18th ultimo, submitting your report on a railway reconnoissance in the Rohilkund Province.

2nd.—The Lieutenant-Governor has perused this report with the interest and attention which the subject eminently merits, and would desire to record the deep obligation under which you have placed this Government by furnishing to it a paper of so minute, full and practically valuable a character, after the limited period which was alone at your command for the purpose of the enquiry.

3rd.—The Lieutenant-Governor would request you to receive the expression of his heartiest thanks and approval for this excellent and voluntary service.

4th.—The report, with all its appendices, will be printed in an early number of the public *Selections*, and the subject will engage the earnest consideration of the Government.

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No. 13.

NOTES ON THE SUBJECT OF PAPER-MAKING IN INDIA.

Notes relative to the subject of paper-making in India, and the numerous articles suitable for this manufacture, with the results of experiments made in the Moradabad Jail on a few of these.

1.—Much interest and anxiety has been excited of late years in England in reference to the manufacture of paper, owing to the very greatly increased demand caused by the reduced rate of postage, the introduction of cheap publications in every form and shape, &c., &c. In short the march of intellect, thirst for interchange of souls, and individual literary attainments and improvement, have far outrun the means through which these were formerly made available.

2.—It would be irrelevant to the subject of these pages were I to introduce any detailed description of the origin and progress of paper-making, or to quote any statistical facts to show the enormous consumption of this article in Great Britain and its numerous dependencies—these are topics well known to all; nor is it worth while to enquire into the causes whereby the attention of paper-manufacturers has not been turned more searchingly to the provision of other articles besides linen and cotton rags, ropes, cordage, &c., for the manufacture of such an essential and valuable requisite of civilized life, until the very moment they found themselves almost shipwrecked from a deficiency of such supplies.

3.—The object of the following remarks is more to show that in India we have infinite resources available for the manufacture of paper of the best quality to supply the deficiency in the home market, and which might be exported in the crude state or as a manufactured article.

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4.—It seems to me an extraordinary fact that in a cotton-growing country, and where the inhabitants to boot from Cape Comorin to the Hindoo Koosh Mountains universally wear cotton clothing, that this almost unlimited means of supply of one of the best articles (viz. cotton rags) for the manufacture of paper should have been taken so little advantage of. I am not aware that as an article of export cotton rags are thought much of, and most probably the expense of conveying them to England would be far too great for any profitable end.

5.—But it seems very astonishing, considering the vast amount of paper used in the public offices alone in India, that the attention of Government has not been turned to manufacturing paper in this country for its own use, especially when such large quantities of first-rate raw materials are procurable. I write under correction of course, but I suppose that at Serampore alone in this Presidency is advantage taken of the facility in getting cotton rags for making paper.

6.—It is not much to be wondered at that the native paper-manufacturers have not used this article, as with their defective machinery it is difficult except with much labour to reduce cotton rags to a sufficiently fine pulp for the manufacture of serviceable paper.

7.—But since the supply at home has become scarce and the interest of the public has been excited in consequence, so in like manner in this country the attention of individuals as well as that of Government has been called into action in forwarding all schemes for the development of the resources of this vast empire, and amongst these the subject of paper manufacture has claimed a portion.

8.—Perhaps there is not a country on the surface of the globe that is more adapted from the nature and variety of its indigenous as well as cultivated plants to supply an almost infinite quantity of raw materials for the ma-

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nufacture of textile fabrics of great diversity and commercial value, and from the refuse of which alone we have means which might be made useful in manufacturing paper. Besides there are innumerable fibres which from their coarseness and shortness of staple are unsuited for weaving purposes, &c., still are eminently useful for the purpose of paper-making.

9.—Having lately had an opportunity of trying a few experiments in the Jail attached to this station as to the practicability of making paper from various substances, I beg to submit a few notes explanatory of the mode of procedure, thinking that possibly they may prove interesting.

10.—The experiments were at first carried on more in a spirit of dilettanteism rather than with a view to any commercial results that might accrue; but having been led to believe that they were to some extent successful, I have had them repeated with a view to the market value of the papers produced, and have now to submit the results, hoping in conclusion to show that with improved apparatus there will be little difficulty in turning out paper of a superior quality, and certainly infinitely so to what is now generally used in our public Courts. I have limited my trials to a very few substances, for the following reasons:—first, because they were easily procurable; and secondly, because I did not wish to interfere with the regular working of the paper manufactory, which with great difficulty is able to supply the demands upon it. If these trials are thought of sufficient importance to justify more extended operations, then I shall be happy to use my best endeavours to manufacture large quantities of any of the papers that may be most approved of or of most commercial value.

11.—The papers already manufactured are from the following substances, the first of which was the plantain (musa paradisiaca). Three separate experiments were tried with this, viz., 1st, from the whole plant. No care was taken in

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preparing this kind, *i. e.*, the whole plant, including leaves, was merely chopped up, pounded into pulp, and then made into paper. The paper, though tolerably strong in texture, was not of a good colour, from the numerous black spots caused by the dried particles of the leaves. It however might be useful to the native shopkeeper and druggist, and for wrapping up parcels generally, but I do not think it of sufficient market value to repay any time or labor that might be bestowed in its manufacture more extensively.

The second trial was made upon the stem of the plantain. The paper turned out was more uniform in its colour than the first and strong in texture, but was stiff and apt to crack from the quantity of mucilaginous matter contained in it. It might be useful as a paper for wrapping up parcels, &c., but not of sufficient quality to justify any outlay in its manufacture. Two samples were then made from the plantain leaf stalk, the one thick, the other thin. These papers showed much improvement in texture, strength, and uniformity of color—the thinner sort being well adapted for service envelopes, from its lightness and toughness; the thicker kind would be a very serviceable paper for wrapping up parcels, and in fact for all the uses brown paper is put to in England. I think this kind of paper well worthy of further trial, as it would no doubt bring a fair price in the market if manufactured on a large scale. I have below given the cost of preparing it, employing prison labour and calculating the price at which the raw material could be readily procured.

Plantain stalks eight maunds, at two annas per maund,	Rs.	1 0 0
Lime, &c.,...	"	0 6 6
Prison Labour, ...	"	5 0 0
Total, ...	Rs.	6 6 6

This paper could easily be supplied at Rs. 1-10-0 a guddee if manufactured on a large scale, and with improved apparatus at a less cost even.

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The next trials were made with the wild aloe (agave cantula). The papers made from this fibre I am of opinion are very encouraging, and well suited fer Persian writings, service envelopes, &c. They are also capable of much improvement in manufacture by carefully bleaching the pulp before making it into paper. I think this kind of paper well worthy of further attention and care in making; it might be supplied on a large scale at Rs. 1-12-0 a guddee, or Rs. 3-8-0 an English ream.

Bhoosa (wheat straw) formed the subject of the third experiment. The paper from it has proved more curious than useful, perhaps; at any rate it is an illustrated fact to the natives that paper can be made from such material (I write under correction of course); but I imagine that this is the first attempt at making paper from Bhoosa in India. It might be improved in colour, but I scarcely think it worth the trouble of manufacturing as an article of commerce. A small quantity of the Bhoosa pulp was mixed with flax and manufactured, but the result does not justify any recommendation of this paper.

The flax (linum usitatissimum) was next brought into requisition, and the paper made from it was I think a very fair specimen indeed of native manufacture, and well worthy of further and extensive trial. I am of opinion that with more care bestowed in pounding the pulp, bleaching and making into paper, it might be made equal to the Calpee paper, so extensively used in our Session and Civil Courts.

Hemp (cannabis sativa) was also made into an excellent paper, and with improved apparatus, &c. might be made much purer in colour and finer in texture than the kind already manufactured.

Specimens of paper made from cotton rags were then made—a thicker kind, to be used as blotting-paper, and which turned out to be remarkably well suited for the purpose. It could be supplied at eight annas a quire on a

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large scale, and from its quality is cheap at this rate. A thinner sort was also made, which is capable of great improvement in manufacture and might be made to imitate closely the Serampore paper supplied to the public offices.

Common blotting-paper has been made for some time in the Jail, and further experiments were tried in its manufacture, and what is now in store is well adapted for the purpose intended; it is manufactured solely from waste paper, no sizing of course being added. The colour is given with safflower, but is evanescent; a better shade of pink might be produced by extracting the colour from scarlet woollen rags, or even pounding them up with the waste paper. This paper it is fair to state has been approved of by Government and ordered to be supplied to the public offices from the Moradabad Jail.

Paper made from ruddee or waste paper is a common manufacture all over India, and is regularly made in the Jail. Tat (crotolaria juncea) is also in common use as a raw material for making paper, and a mixed paper manufactured from ruddee, tat and hemp is constantly supplied to the public offices at Bijnour and Moradabad.

The new papers, however, if manufactured on a large scale would for many purposes, especially purwanas, &c., to be sent by post, quite supersede the common Hindustanee papers, both from their superiority of texture and lightness.

The papers above enumerated were all made exactly according to the native plan; and if this circumstance is considered perhaps it will not be wondered at why they are not of finer texture and better colour.

To the uninitiated the following description may tend to give an idea of the primitive nature of an Indian paper-making machine and the order in which the process is carried on and accomplished.

The materials from which the paper is made are coarse canvas, made from phoolsun and putsun, inferior kinds of

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flax, and called tat, and occasionally from old hempen bags (janga) when procurable,—old ropes of the same materials and waste Hindustanee paper, or ruddee as it is termed.

No English paper which has been written or printed upon is ever allowed to be mixed with the above articles.

The reason for this is the difficulty experienced in extracting English writing or printing ink. Indian ink, on the other hand, being made merely of lampblack, gum and water, is easily removed by the simple process of washing. The expense of the above raw materials varies of course owing to the demand, but the first, *viz.*, tat, can generally be procured in this district for about one rupee a maund of eighty pounds, and the second at Rs. 2-8-0 a maund; whilst the ruddee costs on an average Rs. 5 per maund. It is consequently sparingly used, except in the manufacture of the higher-priced papers, to which it imparts a better colour and smoother consistence, though the strength of the paper is somewhat deteriorated.

This stock having been procured, the manufacturer proceeds to reduce it to a state of pulp.

Ten maunds of the tat is cut up into small fragments by means of a common axe, after which it is thrown into a vat made of bricks, generally four feet deep, seven in length, and six in breadth. In the bottom of this vat, at one side of its lesser diameter, is imbedded a large block of stone (generally in this part of the country procured from the bed of the Jumna); these vary in size, but are for the most part two feet broad by four feet long, and one and a half to two feet in depth. A portion of water sufficient to wet the whole mass is then added, and it is now subjected to the process of pounding.

This is effected by means of the following apparatus, *viz.*:—

A beam made of babul wood, ten feet in length and nine inches in breadth and thickness, into one end of

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which is fixed an upright round piece of wood or pestle, four feet in length and nine inches in diameter, and bound at the lower end with iron; on the under surface of this pestle two teeth, or rather beaters, are inserted, made of iron, and placed parallel to each other; these measure five by three and half inches. Four feet from the pestle end of the beam is driven a round piece of wood right through; this is supported on two notched uprights driven firmly into the ground, and forms the fulcrum on which the lever moves.

The power is applied five feet from the fulcrum, and the space through which the end of the lever traverses is eighteen inches.

It is worked by six men, three on each side. The lever is depressed by the men simultaneously applying one foot on the beam, and the force is delivered at the pestle, and by their suddenly taking their feet off, and in this way the work proceeds. Two men sit in the bottom of the vat, and feed in the cut tat, &c., in small quantities between the beaters and the block formerly mentioned.

This pounding operation is carried on for three days successively.

The stuff is then washed and dried, and exposed to the sun for three or four days. It is now returned to the vat, and has added to it 100 pounds of "sujjee," a very impure subcarbonate of soda, and 50 pounds of slaked lime, moistening with water at the same time, and mixing all well together.

It is now beaten for eight days more, washed, and dried in the sun as at first; then sujjee and lime added in the same quantities, beaten for eight days, dried and exposed as before; then 50 pounds of sujjee is added and 25 pounds of lime; again beaten till fine enough, which is generally three or four days; then washed, and put into the paper-making vats. Washing the pulp is performed as follows:—It is put into earthen vessels or naunds, at a river side, if

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possible, and trodden with the feet, adding from time to time fresh water; then thrown into a sheet tied at the ends round the waists of two men; they take this into the middle of the stream and allow the running water to pass through the sheet (not over it), shaking at the same time the pulp to and fro: this constitutes the process of cleansing. The pulp is now considered ready to be made into paper; this is accomplished in the following manner—premising that four vats are considered the proper complement to one beating machine:—The vats are four feet square and also four feet in depth; they are filled with clean water, and a quantity of the pulp is placed on a space at the right hand of the spot on which the paper-maker squats; he breaks this pulp up with his hands, and with an earthen cup adds water from the vat, with which he washes small portions of the pulp into it; this operation goes on until all the pulp is got into the vat. He then with a long bamboo diligently stirs it about in the water, giving a striking motion every now and then to break up any larger portions. After this has been continued for about an hour the pulp is allowed to settle down in the vat: the heavier particles of course reach the bottom first, and leave all the finest of the pulp uppermost. When this is effected the paper-maker then puts two bamboos in a longitudinal direction from the front of the vat across the top. He then takes a barred frame of wood, upon which he puts a screen or chick made of fine grass, fixing two pieces of wood at the sides to regulate the breadth of the paper, its length being determined by the length of the chick; the general size is twenty-two inches long by nineteen broad. He takes hold of this frame, &c., in both hands, and after passing it frequently across the water to bring up some of the pulp, he dips it vertically into the vat, and then brings it into a horizontal position on a level with the water. He moves the frame gently to and fro, so as to spread the pulp equally, raises it, and again dips it into the pulp, repeating the same

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process as at first; he then raises it and puts a bamboo horizontally across the two longitudinal ones formerly mentioned, and rests one end of the frame on this in an oblique direction, the other edge being placed on the side of the vat; the superabundant water thus is allowed to escape, and after removing the two small pieces of wood from the screen he turns down the top of it a little, so as to facilitate the separation of the sheet, and puts it down flat on the space at his side from where the pulp was washed into the vat. In this way he goes on laying one sheet on the top of the other without any intermediate cloth or substance of any kind, until he has got ten quires made, or a "guddee" consisting of 240 sheets; this generally takes him the whole day to accomplish.

This heap is pressed by means of a board about two-thirds the breadth of the paper and twice its length, two men adding their weight to this. The board is first placed at one side and the moisture as far as possible expressed, and then it is removed to the other side of the upper surface. It is now allowed to remain all night, and in the morning the process is repeated.

This is all that is thought sufficient before the paper is dried. Drying is accomplished thus:—Each sheet is separated and actually plastered upon a wall which has been made smooth for the purpose. In fine weather this is done in the open air, and then the process is a very easy matter; but in wet weather or during the rainy season it is difficult to get space enough to put the paper upon as soon as made in a large manufactory, owing to the time it takes to dry.

When dry the surface which was in contact with the wall is tolerably smooth, the other is still rough; this roughness is rubbed down where most conspicuous by pieces of burnt bricks. The paper now is ready for sizing. This operation, like all the rest, is sufficiently primitive: the sheets are arranged smoothly in heaps, a size made

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of wheaten starch is applied with a kind of mop made of rolls of coarse flannel or blanket dipped into the starch and passed over the paper; it is afterwards hung up on lines to dry.

The paper has still to go through another operation before it is fit for use.

This consists in polishing it, which is effected as follows:—

A curved piece of wood, about three feet long and nine inches broad, is fixed firmly on the ground, having its concave surface uppermost (this is generally made of mango wood). The workman leans down on his knees and bends over it, having at his side a quantity of paper and a piece of rag slightly moistened with oil. He lays a sheet of paper on the wood and passes the oily cloth very gently over its surface; he then with both hands commences polishing it with a piece of common jasper or blood-stone, made convex, and generally about two or three inches long. This stone is imbedded firmly in an elliptical piece of clay about six inches long, so as to allow a firm hold being taken of it with both hands. The workman passes this rapidly up and down the paper with considerable force, until a polish appears on the surface; having turned the sheet he repeats the same process. The paper is now folded, sorted, cut and made up into quires and "guddees," two of which make an English ream.

The quantity of paper that one man can polish if expert in one day is five quires, or 120 sheets. I have been perhaps too minute in my description of the above process; but the object in view has been to admit of comparison between the Indian mode of making paper by the hand and the same process as followed in England.

The amount of manufactured article from ten maunds of raw material is calculated to be sixty guddees or thirty English quires; and if we consider the immense amount of labour expended, added to the price of materials and the

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time consumed, and withal the inferiority of the article produced, the result is very unsatisfactory.

Below is a detail of the actual expense incurred:—

Ten maunds tat, at 1 rupee per maund, ...	Rs.	10	0	0
Three maunds five seers sujjee, at Rs. 1-12-0 per maund,	„	5	7	6
One maund twenty-two and a half seers lime, at ten annas per maund, ...	„	0	15	7½
Size and wood for making it ready, ...	„	3	15	0
Strong wrapping-paper, &c., ...	„	0	8	0
Cutting tat, ...	„	2	0	0
Pounding do., ...	„	11	0	0
Washing do., ...	„	3	0	0
Making paper, ...	„	11	4	0
Drying do., ...	„	3	12	0
Sizing do., ...	„	3	12	0
Polishing do..	„	11	4	0
Sorting, cutting, &c., ...	„	0	15	0
Total, ...	Rs.	67	13	1½

The paper when ready for the market weighs about four and a quarter seers per guddee; twelve chuttacks, or one pound and a half, however, is to be deducted as weight of size, so that the actual weight of paper made is three and a half seers, thus making a loss of no less than four maunds and thirty seers in the mere processes of cutting, beating, and cleansing. The price of the paper is regulated by its appearance, &c. Supposing all to be of good quality that is produced from ten maunds of raw materials supplied, then it would sell at an average price of Rs. 1-10-0 per guddee, or for the whole produce Rs. 97-8-0. This sum after paying all expenses of manufacture leaves a balance of Rs. 29-11-10½, from which the manufacturer is to live and keep up the tear and wear of his machinery, such as it is; in other words for every guddee of paper sold he gets a profit of say eight annas, the actual cost of production being Rs. 1-2-1. This gives the most favorable view of the case, and supposes that the manufactory is in constant work, whereas during the rains very little is made by the native paper-maker.

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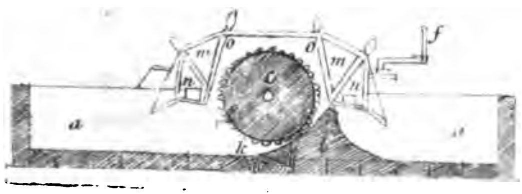
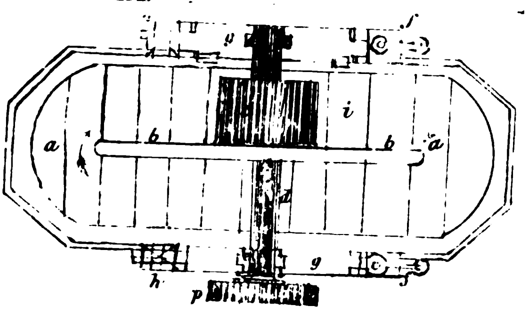
To those particularly interested in the construction of the paper machines now used in England, I would refer them to Doctor Ure's Dictionary of Arts, &c., from which I have copied the following curtailed description of the stuff engine, the introduction of which into our jail paper-manufactories I conceive would be of infinite advantage in improving the quality of the pulp, and consequently the paper made from it; other improvements, such as presses, &c., might also be added, but which it is unnecessary to detail here.

The construction of the stuff engine is represented in figures 1 and 2. Figure 1 is the longitudinal section, and figure 2 the plan of the engine. The large vat is an oblong cistern rounded at the angles. It is divided by the partition B B, and the whole inside is lined with lead. The cylinder C is made fast to the spindle D, which extends across the engine and is put in motion by the pinion P fixed to its extremity. The cylinder is made of wood and furnished with a number of blades or cutters, secured to its circumference, parallel to the axis, and projecting about an inch above its surface.





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Immediately beneath the cylinder a block of wood, K, is placed. This is mounted with cutters like those of the cylinder, which in their revolution pass very near to the teeth of the block, but must not touch it. The distance between these fixed and moving blades is capable of adjustment by elevating or depressing the bearings upon which the necks E E of the shaft are supported.

The rags being put into the engine, filled with water, are drawn by the rapid rotation of the cylinder between the two sets of cutters, whereby they are torn into the finest filaments, and by the impulsion of the cylinder they are floated over the top of the breasting upon the inclined plane. In a short time more rags and water are raised into that part of the engine vat. The tendency in the liquid to maintain an equilibrium puts the whole contents of the cistern in slow motion down the inclined plane, so that they are repeatedly drawn out and separated in all directions, till they are reduced to the appearance of a pulp.

In the operation of the cylinder it is necessary that it should be enclosed in a case, or it would throw all the water and rags out of the engine, in consequence of its great velocity.

The operation of grinding the rags requires nice management. When first put into the washing engine they should be worked gently so as not to be cut, but only powerfully scrubbed, in order to enable the water to carry off the impurities. This effect is obtained by raising the cylinder upon its shaft, so that its teeth are separated considerably from those of the block. After washing in this way for twenty or thirty minutes the bearings of the cylinder are lowered, so that its weight rests upon the cutters. Now the supply of water is reduced, and the rags begin to be torn—at first with considerable agitation of the mass and stress upon the machinery. In about three or four hours the engine comes to work very smoothly, be-

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cause it has by this time reduced the rags to the state of half stuff. They are then discharged into a large basket, through which the water drains away.

The bleaching is usually performed upon the half stuff. This is generally done with chloride of lime. From one to two pounds of this is sufficient to bleach one cwt. of fine rags.

The half stuff thus bleached is now transferred to the beating engine, and worked into a fine pulp. This operation takes from four to five hours.

The pulp is now run off into the stuff chest, whence it is taken out as wanted.

The paper made in our jails is better generally in quality than that sold in the bazar, if care is taken in its manufacture and it is properly sorted before being allowed to leave the manufactory. More waste (though not actual loss) occurs no doubt from many causes, viz., inexperience in making, tearing in drying, sizing, &c., change in the hands employed, sickness, and lastly an innate spirit of blackguardism which it is difficult sometimes to eradicate. Notwithstanding all these drawbacks, it is a very profitable mode of employing prisoners, and the pounding apparatus affords an opportunity of giving very hard work to the greater offenders.

I have heard it objected to as being unfair, the employment of prisoners in making paper in jail, as it interfered with the regular trade of the free laborer. It certainly to some extent does, but it also stimulates him to make a better article, and this result has actually taken place in this city since the paper manufactory was set agoing in the jail. I consider, myself, it is quite a legitimate way of employing convicts, as the paper made is not sold in the bazar but supplied to the public Courts.

There is also another great object to be kept in view, and that is the improvement in manufacture and the judicious application of the means that superior intelligence

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and scientific knowledge has afforded us for developing the resources of the country, and by the use of improved machinery to stimulate the paper-manufacturer to go and do likewise. Some may say this may be all done by pointing out the way to the natives. No encouragement in words I am convinced is sufficient for any native, even the better educated of them: they have not the "heart" to launch their rupees into an onward current, however safe, because they fear breakers ahead. What they require is a practical illustration of the fact that two and two make four, and not to be told merely that it does so. A little, very little perhaps, has been done in the Moradabad Jail to improve the manufacture of paper with the defective apparatus in use; but even from what has been done I feel that it is quite within the range of possibility not only to infinitely improve the manufacture of paper from the raw materials now in use, but to introduce new articles in the shape of cotton rags and fibres for this purpose, and amongst the rest to bring (from native apathy alone) the now lost flax plant into very extensive use in making foolscap paper for the use of our public offices. It is well known that this paper is made of the best material in England, viz., linen rags, and moreover up to this moment made by hand, as anyone may convince himself by looking at the rough edges of a sheet of foolscap; why then should not flax give us as good an article, especially as we have means in all conscience sufficient for bleaching it thoroughly before it is actually made into paper? I would, with all deference, then, strongly urge the attention of Government to sanction the introduction into our large central jails of the hand-making paper machinery as used in England, and I have no doubt the result would prove very satisfactory.

The stuff machines in England are generally driven by a water-wheel, but in a communication I addressed some months ago to Captain Allen, the Superintendent of Workshops at Roorkee, on the subject of employing a treadmill

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instead of any other moving power, he thought that there could be no objection to this plan. I requested him to make me a model at the same time, but as he had a great press of work on his hands, he found that it was then impossible to do so.

As the machinery of either a treadmill or stuff machines for making paper is not by any means complicated, I have no doubt that they could be easily made and adapted to work together at Roorkee; and a pattern having once been obtained, duplicates might easily be made in the workshops of the jails themselves. We would thus, I am convinced, be supplied with the means of being perfectly independent of home supplies of paper in a very short time. The natives I consider peculiarly well adapted for paper-makers, as they soon learn the "tactus eruditus" necessary for lifting and spreading the pulp on the frames. It is the inferiority of the pulp itself which is the great cause of the inferiority of the paper.

The colour of the paper made in India is not by any means so good as that in England; but if we had a finer pulp, the washing would be better accomplished, and by the use of the stuff machines and wooden vats for making the paper itself this end would be obtained as far as useful, or even desirable perhaps. It is well known that owing to competition, scarcity of material, and the demand for a very cheap article in England, that paper manufacturers resort to most improper practices to obtain a white and cheap article by the admixture with the pulp of plaster of Paris, &c. It is doubtful whether the large quantities of chloride of lime used for bleaching at home is more than temporarily beneficial, as paper in which this is mixed to a great extent rots very easily and soon becomes discoloured, and is therefore objectionable for uses where writings such as law papers, &c., are necessarily kept for a long time as records. It has therefore been thought better by many scientific writers on the subject that the

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old plan of bleaching in the sun and using merely slaked lime is the best for making the most durable paper. Consequently, if we do not succeed in making a very white paper for common purposes, we can at all events make a good one, and cheaper than if the chloride of lime was used as a bleaching agent. For fancy purposes, such as fine note-paper, blotting ditto, &c., it would be absolutely necessary to use this substance; but the time has scarcely arrived yet for entering the field against the De la Rues of home celebrity. The great object is to procure superior and lasting papers in the shape of foolscap (even though it is not so delicately blue as that now in use) and other kinds for the use of our public offices. I am of opinion that this is within our reach; and if what I have written above be at all to the point I should like much to see the experiment tried in the jails of these Provinces.

W. S. STIVEN, M. D.,
Civil Assistant Surgeon.

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No. 14.

IMPORTATION OF ARSENIC INTO THE BENARES DIVISION FOR UNLAWFUL PURPOSES.

I.—*From* H. C. TUCKER, ESQ., *Commissioner, 5th Division, to* W. MUIR, ESQ., *Secretary to Government, North-Western Provinces, Agra, No. 164 of 1854.—Dated Camp, Bulleeah, the 20th November, 1854.*

WITH reference to Government Order dated 6th instant, No. 2235A., I have the honor to submit a letter from the Officiating Magistrate of Azimgurh, dated 16th instant, No. 111, relative to the large traffic which exists in white arsenic; and request the orders of His Honor the Lieutenant-Governor as to the maunds 20-6-2 of that poison now in the Magistrate's hands.

2.—The import of white arsenic at a duty of 10 per cent. is authorized by Section 3, Regulation XV., 1825, but the Legislature could hardly have contemplated the sale of this virulent poison by maunds.

3.—I am not aware of any uses for it beyond the small quantity used in medicine and in arsenical paste for skins preserved by sportsmen; some is said to be used in the whitewash of some European houses, but this must be a very insignificant quantity.

4.—After the discovery which has been made as to the enormous extent to which this poison has been used in destroying cattle, and the great danger which exists that those who have found it so useful against cattle may come to use it equally unscrupulously and successfully against human beings, I think that measures ought to be taken to restrict within very narrow bounds the sale of white arsenic.

II.—*From* G. CAMPBELL, ESQ., *Officiating Magistrate of Azimgurh, to* H. C. TUCKER, ESQ., *Superintendent of Police, 5th Division, Benares, No.* 111 *of 1854.—Dated Azimgurh, the 16th of November, 1854.*

I HAVE the honor to inform you that Allee Khan (of whose deputation I have informed you) has succeeded in

tracing as far as I have thought it desirable the source of the arsenic with which the chumars of this district have been supplied. The dealers, who have sold the poison directly to the chumars, are shopkeepers of Kopa Gunj, of this district, Bahader Gunj Kasreh, and other places of Ghazeepore and of the cantonments of Dinapore. In their case I think that the presumption that it was likely to be used for unlawful purposes is so strong that they are undoubtedly criminal, and I have put them on their trial. My letter No. 99, dated 21st ultimo, requesting instructions, has reference to their case, and I have also put it to the law officer at Agra in calling for a futwah.

2.—I now address you in regard to another class of persons, viz., the dealers who supplied the shopkeepers last mentioned—that is, those who are not proved to have sold arsenic direct to chumars, but who have sold it wholesale to the inferior dealers. The wholesale arsenic merchants principally reside in the City of Patna and get their supplies direct from Calcutta. I have ascertained from the Collector of Customs, Calcutta, that white arsenic of the description used in this district is imported by sea in not inconsiderable quantities almost entirely by native dealers, and that the traffic is not prohibited or restricted. In the Patna shops large quantites of the article were found, and the books of the merchants show its sale in still large quantities during the last year or two. The merchants themselves all fully admit the traffic, merely asserting that it was not prohibited, and that they did not know that the arsenic was used for illegal purposes. They all with one accord state that this traffic has enormously increased within the last two or three years, and especially the last year. They say that white arsenic was formerly sold in small quantities, but that lately it has been very abundantly supplied and has been sold in large quantities; and that it has also been of late much reduced in price and has therefore become more generally accessible. They

cannot account for the greatly increased consumption. They know of no legitimate use to which it is applied except in the composition of medicines and to mix with the whitewash of English gentlemen's houses (so they say) to keep off insects. Except in the case of one leather-merchant of Kopah, it does seem that there is ground for connecting leather-merchants with the system of poisoning. The arsenic has been supplied in a regular mercantile way to the retail dealers, who have sold it to the chumars. It is then certain that the poison has of late become cheap, plentiful, and common, and has been supplied to the chumars without stint and without effective restriction—whence all the evil.

3.—Allee Khan has brought here the Patna merchants, their books, and the white arsenic found in their shops. One man admits to have received from Calcutta during the last year no less than 100 maunds, or nearly *four tons* of the poison, of which his books show the sale of upwards of 88 maunds, and upwards of 11 maunds was found in his shop and is now in my possession; but as in the present state of the law it is at least doubtful whether any crime can be established against these persons, I have not thought it at present desirable to do more than examine them without oath and take attested copies of the entries in their books relating to the arsenic traffic. I have for the present dismissed them after taking an engagement to appear and produce their books before the Magistrate of Patna if called on; but I think it right to retain the arsenic, pending the orders which I now solicit, since if it be determined to put any restriction on the traffic it is desirable not to throw so large a quantity on the market in the meantime free from all restriction. I enclose a list of the quantities of poison found and retained by me to which this letter refers, and exclusive of that found in the shops or houses of individuals under trial.

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4. You will observe that there is a wide distinction between yellow arsenic, or "hurtal," and white arsenic, or "sunkya."* The former (hurtal) is I believe a combination of arsenic with a large proportion of sulphur. It is largely used in manufactures and for painting, &c., &c., and is very common in every bazaar, but is of a much less deadly and more bulky character than the other, so that it cannot conveniently be applied to the purpose of secret poisoning, and in fact does not seem to have been at all so used. The white arsenic on the other hand is simply a most deadly poisonous drug, and so far as I can ascertain (and I have much enquired) is used for no other purpose; it is only thus used in the very smallest quantities. It is possible that it may be sometimes used to poison insects, but my own impression is that it is the yellow "hurtal" which is generally used for this purpose when secrecy is not desired and bulk is not inconvenient.

5. I have asked the Collector of Customs to be good enough to supply me with a memorandum of the quantities of white arsenic imported during the last 5 or 10 years.

6. The value of the article as sold wholesale is, I understand, about Rs. 18 per maund.

7. I request instructions regarding the poison in my possession, detailed in the accompanying list, and an opinion whether the owners can be brought to trial for any offence.

8. It is impossible to doubt that it is necessary to put some legal restriction on the traffic in poison, and I cannot at present see any serious inconvenience likely to result from the absolute prohibition or very stringent restriction of the sale of white arsenic. This will no doubt be matter for consideration; and any further information

* To prevent mistake, I may mention that, if yellow arsenic be literally translated as "yellow sunkya," the term is applied by the natives to a yellow variety of the white arsenic; while what we call yellow arsenic is considered by them to be a totally different article, under the name of hurtal.

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bearing on the subject which I may obtain shall be subsequently reported.

List of the quantities of white arsenic retained in my possession, and found in the shops of individuals who have not been put on their trial, being merchants who have sold the poison wholesale to other dealers, but not retail to chumars.

Name of Dealers.	Residence.	Quantity of Arsenic.			REMARKS.
		Mds.	Srs.	Cks.	
Kunhoy Lall, ...	Patna.	0	31	0	These and many others admit to have sold much larger quantities during one or two years past.
Roshun Lall, ...	Ditto.	0	8	0	
Sheik Wahid Ally, ...	Ditto.	11	31	1	And has sold upwards of 88 maunds during the last year.
Haje Sohun Lall, ...	Ditto.	4	12	1	
Bunsee, Khutree, ...	Ditto.	2	0	0	And these brokers show large quantities already sold.
Gungaram, Marwary,	Ditto.	0	35	0	
Narain Pandy, ...	Ditto.	0	9	0	
		20	6	2	

III.—*From* W. MUIR, ESQ., *Secretary to the Government of the North-Western Provinces, to* W. GREY, ESQ., *Secretary to the Government of Bengal, No. 2501A. of 1854.—Dated Camp, Heerapore Bubeena, the 14th December, 1854.*

From Commissioner, Benares, dated 20th ultimo, No. 164, with enclosures.

IN continuation of my letter dated 6th ultimo, No. 2236A., I am desired to forward copies of the documents noted in the margin, and to state that the Lieutenant-Governor, North-Western Provinces, will be obliged by a report being requested from the Magistrate of Patna on the subject of the large importations of white arsenic referred to by the Magistrate of Azimgurh, and on the account which may be given on the spot by the native dealers as to the object for which such extensive supplies of the article are procured and of the parties to whom they are usually sold.

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2. A copy of a letter addressed on this date to the Medical Board is annexed.

IV.—*From* W. MUIR, ESQ., *Secretary to the Government of the North-Western Provinces, to the* MEDICAL BOARD, *No. 2502A. of 1854.—Dated Camp, Bubeena, the 14th December, 1854.*

From Commissioner, Benares, dated 20th November, No. 164, with enclosure.
To Secretary to Government, Bengal, of this date.

I AM directed to forward copies of the correspondence noted in the margin, and to request that your Board will offer any obseravations and suggestions which may occur to you as to the traffic in white arsenic disclosed by these papers and supposed to be in connection with an extensive system of cattle-poisoning for the sake of the hides, which has been discovered in the Azimgurh district.

2.—The Lieutenant-Governor particularly wishes to know whether there is any large demand for the consumption of white arsenic which can be at all reasonably presumed to be for other than criminal purposes.

V.—*From* W. MUIR, ESQ., *Secretary to the Government, North-Western Provinces, to* H. C. TUCKER, ESQ., *Commissioner of the Benares Division, No. 2503 A. of 1854. —Dated Camp, Bubeena, the 14th December, 1854.*

To Secretary to Government, Bengal. To Medical Board.

I AM directed to acknowledge the receipt of your letter dated 20th ultimo, No. 164, with enclosures relative to the large traffic found to exist in white arsenic, and in reply to forward copies of the letters this day written on the subject.

2. His Honor authorizes the payment of the fair market value of the arsenic obtained from dealers at Patna and detained by the Magistrate of Azimgurh; the amount to be charged in a contingent bill.

3. The enclosures of your letter are returned, copies having been kept for record.

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VI.—*From the* Medical Board, *to* the Hon'ble J. R. Colvin, *Lieutenant-Governor, North-Western Provinces, No. 1389 of 1855.—Dated Fort William, 24th January, 1855.*

We have the honour to acknowledge the receipt of Mr. Muir's letter No. 2502A., of the 14th ultimo, and its enclosures.

2. The observations and suggestions which occur to us are,—1st, that it does not appear quite clearly from the correspondence whether any systematic plan of poisoning cattle by white arsenic has been proved; 2nd, that from a statement of the importation of white arsenic during the last four years furnished to us by the Collector of Customs it would seem that there has been no increase of importation, as had been supposed by Mr. G. Campbell, but on the contrary a decrease. Perhaps therefore some further investigation by the local authorities may be considered desirable.

3. We have been unable, after a good deal of enquiry, to ascertain any cause for an increased importation or consumption of white arsenic, as we have no reason to believe that its medicinal or economical use has increased of late years.

4. The case is different with hurtal, or yellow arsenic. Besides being used for paint, we believe that it is largely employed in the manufacture of shell-lac, and is with a view thereto imported largely into Mirzapore.

5. On a former occasion* we had the honor of suggesting to Government the expediency of an enactment being passed requiring the qualifications of all who retail medicines being tested, and we think that some Regulation requiring dealers to report to the Police any considerable sales of arsenic or other poisonous drugs would not be

* Letter No. 1253, dated 30th March, 1853, to the Most Noble the Governor-General of India in Council, Home Department.

considered an act of oppressive interference on the part of Government.

VII.—*From* W. MUIR, ESQ., *Secretary to Government of the North-Western Provinces, to* H. C. TUCKER, ESQ., *Commissioner of the Benares Division, No. 2B. of 1855.—Dated Camp, the 13th February, 1855.*

IN continuation of my letter dated 11th ultimo, No. 107A., I am desired to forward for your information the accompanying copy of a letter* from the Medical Board on the subject of cattle-poisoning by means of white arsenic.

* Dated 24th January, No. 1389.

2. The subject will be further considered on receipt of the reply by the Magistrate of Patna to the reference made to the Government of Bengal.

VIII.—*From* W. GREY, ESQ., *Secretary to the Government of Bengal, to* W. MUIR, ESQ., *Secretary to the Government of the North-Western Provinces, No. 997 of 1855.—Dated Lieutenant-Governor's Camp, Gya, Zillah Behar, the 10th February, 1855.*

IN reply to your letter No. 2501A., dated the 14th December last, I am directed by the Lieutenant-Governor of Bengal to forward for the information of the Hon'ble the Lieutenant-Governor, North-Western Provinces, copies of the letters noted in the margin.

To Magistrate of Patna, No. 363, dated 27th December, 1854.
From Magistrate of Patna, No. 42, dated 31st January, 1855.

IX.—*From* W. GREY, ESQ., *Secretary to the Government of Bengal, to* W. AINSLIE, ESQ., *Magistrate of Patna, No. 363 of 1854.—Dated Lieutenant-Governor's Camp, Mooteepoor, Zillah Tirhoot, the 27th December, 1854.*

I AM directed by the Lieutenant-Governor to forward the accompanying copy of a letter* from the Officiating Magistrate of

*No. 111, dated the 16th November, 1854.

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Azimgurh to the Superintendent of Police, 5th Division, Benares, on the subject of the large importation of white arsenic by dealers resident in the city of Patna, and to request that you will take measures to procure the fullest information possible from the native dealers at Patna and from any other available sources as to the object for which such extensive supplies of arsenic are procured, and of the parties to whom they are usually sold; and also whether in buying large quantities of the poison the purchasers have ever alleged any particular purpose to which it was intended to apply it.

2. It will be desirable, too, to know whether the wholesale dealers of Patna have been in the habit of procuring their supplies from Calcutta for the purpose of meeting specific orders for the article, or whether they have merely regulated their own orders on Calcutta by what they found to be the general demand.

X.—*From* W. AINSLIE, ESQ., *Magistrate of Patna, on his tour, to* W. GREY, ESQ., *Secretary to the Government of Bengal, Judicial Department, with the Lieutenant-Governor of Bengal on his tour, No. 42 of 1855.—Dated Patna, the 31st January, 1855.*

IN reply to your letter No. 363, of the 27th ultimo, I have the honor to inform you that I have been unable to ascertain for what purpose the large supplies of white arsenic imported during the last two years were procured. The dealers only state that finding it in demand they imported it from Calcutta in such quantities as appeared necessary to meet the demand; that it was principally sold to *beoparees* from the districts to the westward, who carried it away in considerable quantities at a time; and that there was no retail trade of it carried on here beyond the very small quantity purchased by drug-dealers. They also assert that they never heard of its being applied to any other purposes than those mentioned

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by Mr. Campbell (mixing with whitewash and in medicine). I do not think that there is any reason to suppose that the recent large importation from Calcutta has been in consequence of specific orders from purchasers; at any rate the dealers state that such is not the case. How and with whom the demand originated I cannot ascertain. I find that the demand for the drug has been steadily increasing for the last two and a half years; that previously the price varied from Rs. 2 to Rs. 4 per seer, and that it has since fallen to twelve annas, and latterly to six annas a seer. As the application of the poison to the destruction of cattle would be looked upon by Hindoos generally as a heinous offence against their religion, I think it not unlikely that the object of the purchasers was really unknown to the wholesale dealers in Patna.

XI.—*From* C. P. CARMICHAEL, ESQ., *Assistant Secretary to the Government, North-Western Provinces, to the* MEDICAL BOARD, *No. 807 of 1855.—Dated Agra, the 2nd March, 1855.*

I AM directed by the Hon'ble the Lieutenant-Governor to forward, for any further remarks that the subject may seem to call for from your Board, with reference to your report No. 1389, dated 24th January last, copy of a letter from the Secretary to the Government of Bengal, dated 10th instant, No. 997, relative to the importation of white arsenic into Patna.

XII.—*From* H. C. TUCKER, ESQ., *Commissioner, 5th Division, to* W. MUIR, ESQ., *Secretary to the Government, North-Western Provinces, Agra, No. 24 of 1855.—Dated Benares, the 17th March, 1855.*

WITH reference to paragraph 2 of your letter No. 2503 A., of 1854, dated 14th December, I have the honour to submit one this day received from the Officiating Magistrate of Azimgurh (No. 22, of 14th instant), and beg to be fa-

voured with the orders of Government as to the disposal of the eighteen maunds and twenty-nine seers of arsenic now in that officer's possession.

XIII.—*From* W. McChlery, Esq., *Officiating Magistrate of Azimgurh, to* H. C. Tucker, Esq., *Commissioner, 5th Division, Benares, No.* 22 *of* 1855.—*Dated Azimgurh,* 14*th March,* 1855.

I have the honour to request your orders regarding eighteen maunds and twenty-nine seers of arsenic which was found in the possession of dealers at Patna and Ghazeepore, and detained by my predecessor here.

2. The dealers have as you are aware been paid the value of the arsenic, and I await your orders regarding its disposal.

XIV.—*From* C. P. Carmichael, Esq., *Assistant Secretary to Government, North-Western Provinces, to* H. C. Tucker, Esq., *Commissioner of the Benares Division, No. 1511 of 1855.—Dated Agra, the 7th April, 1855.*

In reply to your letter No. 24, of the 17th March, I am directed to state that the arsenic therein alluded to should be effectually destroyed, under the advice of the medical officer.

2. The enclosure of your letter is returned, a copy being kept for record.

XV.—*From* W. Muir, Esq., *Secretary to the Government, North-Western Provinces, to the* Medical Board, *No. 1833A. of 1855.—Dated Head Quarters, the 25th August, 1855.*

I am desired to call your attention to my letter dated 2nd March last, No. 807, and to beg that the further remarks requested therein may be submitted for His Honor the Lieutenant-Governor's information.

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2. I am also desired to forward for the information of your Board the further correspondence noted in the margin, regarding the destruction of a quantity of white arsenic purchased from the dealers at Patna.

From Commissioner, Benares, dated 17th March, No. 24, with enclosure.
To ditto, dated 7th April, No. 1511.

XVI.—*From the* MEDICAL BOARD, *Fort William, to the* HON'BLE J. R. COLVIN, *Lieutenant-Governor, North-Western Provinces, No. 1475 of 1856.—Dated Fort William, 21st January, 1856.*

WITH advertence to Mr. Muir's letter No. 1833A. of 1855, dated the 25th August last, we have the honour to append copies of the letters noted in the margin, and most respectfully to submit that after most careful enquiry we have been unable to elicit any information relative to the modes of consumption of the large supplies of white, yellow, and red arsenic yearly imported into India beyond that conveyed in our letter No. 1389, of the 24th January, 1855.

Letter from Dr. Makinnon, Apothecary to Hon'ble East India Company, to Secretary, Medical Board, No. 145, dated 31st October, 1855.
Ditto from Mr. Young, Officiating Collector of Customs, to the Secretary, Medical Board, No. 259, dated 19th September, 1855.

2. In reply to the question proposed in the 2nd paragraph of the letter under reply, we beg leave to suggest that the best mode of destroying the eighteen maunds and twenty-nine seers of arsenic obtained from the dealers in Patna would be to divide it into several portions and to bury each portion deeply in low, undrained, marshy spots of some remote jungle.

XVII.—*Copy a letter from the Apothecary to the Hon'ble East India Company, to the Officiating Secretary, Medical Board, No. 145.—Dated 31st October, 1855.*

I HAVE the honour, in reply to your letter No. 870, of the 24th ultimo, to state for the Board's information that

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on enquiry from the contractors attached to this department and bazar dealers I am given to understand that a large quantity of arsenic is purchased by up-country dealers, ostensibly for the purpose of preserving timber. Mr. Barry, of the firm of Messrs. Scott, Thomson and Co., druggists, tells me that arsenic is now extensively used, mixed up as a paint, to cover the bottoms of ships. I am however of opinion that a portion of the quantity imported is probably administered as a poison to cattle in the Upper Provinces by the chumars, for the sake of the hides.

XVIII.—*Copy of a letter from the Officiating Collector of Customs, to the Officiating Secretary, Medical Board, No. 259.—Dated 19th September, 1855.*

In reply to your letter No. 796, dated the 7th instant, I have the honour to inform you that the quantity of white arsenic imported by sea into Calcutta between the 1st December, 1854, and the 31st August, 1855, has been maunds 244-36-1.

XIX.—*From* Major G. W. Williams, *Officiating Assistant Secretary to Government, North-Western Provinces, to the* Medical Board, *Fort William, No. 1052 of 1856.—Dated Agra, 15th February, 1856.*

I am directed to inform you that a copy of your letter dated 21st ultimo, No. 1475, with enclosures (which the Lieutenant-Governor remarks has been long delayed), will be sent to the Commissioner of Benares, for communication to the Magistrate of Azimgurh; and the series of papers will in order to draw a continued attention to the subject be printed in an early number of the public Selections.

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No. 15.

Report on the Public Works completed in Meerut in 1854-55.

From E. M. Wylly, Esq., *Magistrate of Meerut, to* H. H. Greathed, Esq., *Commissioner of the 1st or Meerut Division, No.* 93.—*Dated Meerut, the 7th August,* 1855.

I have the honour to acknowledge the receipt of your Circular letter No. 21, of the 17th May last, with its enclosures, calling for a report on the public works of this district.

2. Before describing any of these works, I purpose saying a few words regarding the Nuzzool Fund, from which the larger portion of the expenditure on this account has been defrayed. It is derived from the rent or sale of Government property in land, buildings, shops, baghs, &c. This property is situated chiefly in the city of Meerut, in the towns of Haupper, Baghput, Dasnah, and Ajrarah, and in some of the villages on the bank of the Jumna, where forts were erected in former times as a defence against the incursions of the Mahrattas. In 1843 a complete register of this property was prepared. Some lands, the sites of old forts and shops, the rent of which had always been paid to Government, were afterwards disposed of,* either by public auction or at a moderate price paid by the persons in possession. When I received charge of the district in 1851, Rs. 5,725 had been realized in this way. Since then, in order to obtain a good fund for effecting many important local improvements, I have given much attention to this source of income, which now amounts to Rs. 31,217. In disposing of the property no local prejudices have been offended and no private rights have been interfered with.

3. A large portion of this money has been expended on the general drainage of the station and in the improvement of the town of Meerut. As this is the first report on

* After investigation under Regulation XIX. of 1810.

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the local public works, I propose giving a concise account from the commencement of the mode in which the scheme was undertaken and carried out.

4.—The station of Meerut is intersected by a narrow winding drain, originally a natural escape of water during the rains, but which appears to have been altered in its course and dimensions for purposes of irrigation. This stream, called Aboo Fakeers's Nullah, runs from west to east, dividing the European and Artillery lines from the rest of the station. It serves as a drain, though a very defective one, for the northern part of the station, and empties itself into the Kalee Nuddee, about 4 miles to the east of Meerut. South of the Aboo Nullah are the city and the Sudder Bazar, the sewerage from which escapes into several large tanks, ill-shaped and without regularity of level, situated throughout the Civil lines, and in the Sudder Bazar, and a round the city. To drain this portion of Meerut into the nullah is impossible, as the slope of the country tends in an opposite direction, and the nullah is an inefficient drain even under the best conditions. The street drains also have hitherto been constructed without any continuity of level, and as receptacles rather than escapes of sewerage. Each householder constructed the portion connected with his own house, without reference to the level of that of his neighbour.

5. In the Administration Report for the year 1851, I drew the attention of Government to the defective state of the general drainage of Meerut, and the consequent unhealthiness of the town and cantonment. In consequence of the correspondence received in reply to my representation, I obtained the aid of Mr. Dodsworth, Assistant Surveyor of the Ganges Canal, to take the levels of the whole southern side of the station, including the Sudder Bazar and the city, and the country from thence to the Kalee Nuddee, comprising an area of between 4 and 5 square miles. The result of these measurements showed that the natural slope of the country ran from north-west

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to south-east the highest point within the proposed line of operations being the northern portion of the Sudder Bazar, and the lowest the Sohrab Gate of the city. The line of drainage recommended by Mr. Dodsworth, and its modification by Colonel Cautley and Captain Baird Smith, have already been detailed in my letter No. 4, of the 23rd January, 1854. These officers advised a general plan of drainage, providing for the cleansing of the Sudder Bazar and city, the raising of the beds of the more offensive tanks to 2 feet above their present level, and the excavation of a main drain or water-channel, commencing at the Camel Shed Tank at the southern corner of the Sudder Bazar (marked A. on the plans), and running round the western wall of the city, through the swamp on its southern side, and entering the East Kalee Nuddee by a direct line south-east of the town of Meerut. This main drain was to have a bottom breadth of 15 feet; and with the tail of the escape meeting the average flood of the Kalee Nuddee, it was calculated that a fall of about 18 inches on the mile would be given, the Tank A. being about 6 miles distant from the tail of escape. An estimate of the cost of digging and bridging the main water-channel at the breadth proposed by Captain Smith was furnished by Mr. Read. It amounted to Rs. 18,000. The plan was discussed before His Honor the Lieutenant-Governor, and subsequently modified, after consultation with the officers already mentioned. The plan now carried out is essentially as follows:—The beds of the more obnoxious tanks are to be raised, the tanks are to be no longer used as reservoirs of filth, their surface-water is to be carried off by means of the main line of a drainage which commences from Tank A., situated at the extreme south-east corner and lowest level of the cantonment. The bed of the drain is 5 feet below the surface level or road-way round the tank. By this arrangement 6 feet 11 inches of water will remain in the tank. The drain is divided into two sections,—the

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upper, from Tank A. to Tank B., having a bottom width of 5 feet; and the lower, from Tank B. at the Delhi Gate of the city to its outlet into the East Kalee Nuddee, being 7 feet broad. The slopes are made 1 foot height to 1 breadth, instead of ½ height to 1 breadth, as originally proposed. The fall is 18 inches in the mile. All the Sudder Bazaar drainage runs from north to south in the direction of the Camel Sheds, and enters the main channel where the surface-water of Tank A. is carried off; thence it is conveyed in the direction already described, and as shown on the large plan. The whole length of the drain from Tank A. to the East Kalee Nuddee is 6 miles. In the immediate vicinity of the town it was necessary to cart earth from a distance for filling up hollows and forming the drain banks. Beyond the City to the Haupper road the ground rises, and in some places excavations of upwards of 20 feet deep have been required. The whole line of drainage has been now completed; the actual cost of excavation amounts to Rs. 9,657-1-2. To this must be added the filling in of the sides and shaping and partial excavation of Tank A., at a cost of Rs. 484-14-11. Although this tank is situated in cantonments, as it is at the head of the main drain and its eastern side is the connecting point between the Sudder Bazaar and general drainage, it was necessary to have this work completed without delay, and I therefore requested Mr. Read to carry it out. Thus the total cost of all the earth-work connected with the drainage has up to this time been Rs. 10,141-1-2, at an average rate of Re. 1-4-5 per 100 cubic feet.

6.—Mr. Read's original estimate calculated the cost of bridges on the drain line at Rs. 1,765, allowing for nine drain bridges. This must have been a mere rough estimate without any basis of minute enquiry. No calculation seems to have been then made of the size or even the number of the bridges required, or the extent of masonry

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involved. Instead of nine bridges, thirteen have been required—five of these on the first section of the drain and eight on the second section—besides two masonry inlets of considerable size. The cost of these works amounts to Rs. 7,403-9-10 at an average of Rs. 13-10-8 per 100 cubic feet. The plan and sections of these bridges are appended to this report.

7.—I regret to state that the askew bridge, where the Haupper road crosses the drain, has given way. Mr. Read in consequence of his other avocations was unable to give constant attention to these works, and was necessarily obliged to trust to the Superintendent of Roads for carrying out his plans and for giving materials of good quality. The upper and lower faces of the arch have been washed away, and the mouth of the bridge was for a time filled up; but having been rapidly cleared out and no heavy carriage being allowed to pass over the road-way, the drainage has never been impeded. A temporary wooden bridge has been erected near the roadway, and the bridge will have to be re-built after the rains, at a probable expense of Rs. 1,000.

8.—The whole of the drainage line now completed has stood the test of a most severe and trying rainy season, and the result is most satisfactory. Commencing at the head of the drain, the high water in Tank A. has been reduced by 5 feet. The low swampy ground to the west and south of the city has been cleared of stagnant water, and though the banks of the drain are as yet soft and liable to crumble, the rush of water from the bazars and the surrounding country flows away freely and rapidly into the Kalee Nuddee.

9.—I must here repeat Captain Smith's suggestions that provision be made for the future repairs of this work. Constant attention will be requisite for the next two or three years, until the banks become thoroughly consolidated. If this be neglected, the work must go to ruin. At

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least Rs. 300, at the rate of Rs. 50 per mile, will be required for annual repairs. Another contingency must also be looked to: several channels of escape for the sewerage of the city may yet have to be supplied with masonry inlets to the drain. A masonry outlet at the tail of escape into the Kalee Nuddee may also have to be provided.

10.—I recommend that the Director of the Ganges Canal and Executive Engineer of this division of the canal be requested to superintend the future repairs and additions required for these drainage works. As they originated in their suggestions and have been carried out by them, they will naturally be more readily reponsible for their maintenance than the officers of another department.

11.—The orders of Government contained in Mr. Secretary Muir's letter, No. 1857, of the 18th April, 1854, provide that the expenses connected with the main drain shall be contributed in equal proportions from the available funds of the cantonment and district. The actual cost of masonry and earth-work has been Rs. 9,656-2-3+7,403-9-9=Rs. 17,059-12-0, the half of which, Rs. 8,529-14-0, should be thus debited to the Cantonment Funds, besides the sum of Rs. 484-14-11, incurred on my responsibility for the earth-work of Tank A., within cantonments. An advance of Rs. 10,000, one-half of which from Nuzzool sources and the rest from Cantonment Funds, has been allowed in the orders of Government above quoted towards carrying out the drainage works. The only outlay actually expended by me in excess of this amounts to Rs. 7,544-11-0, for which I request the sanction of Government.

12.—Nothing has yet been done regarding the shaping of the tanks in the civil station, and raising and levelling their beds. It seemed to me unadvisable to undertake any measure of the kind involving expense until the completion of the main work. Prison labor will not I fear be available for these operations, and the work can only be done by hired labor at a cost of little short of Rs. 8,000.

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13.—Drainage and general improvement of the town. A new street, the only practicable thoroughfare, has been opened out through the town. It passes through the large bazars and grain market within the walls, and connects the town with the station and principal highways. This street is lined with neat, well-built shops, already yielding handsome rent to the proprietors. The large swamp outside the Delhi Gate, which poisoned the atmosphere and prevented all convenient egress towards Delhi, has been filled up by prison labor, and the ground now forms a large semicircular space, on which the people have taken sites for new shops. The cost of this work, including compensation for houses and the facing of the main street, has amounted to Rs. 7,560-15-0, which expenditure has already been sanctioned by Government and ordered to be defrayed from the Nuzzool Fund.

14.—The orders for carrying out the City drainage were received after the completion of the above work. The accompanying plan, No. II., of the city and its outskirts, will show the line of drainage that has been primarily undertaken. The highest point in the city is the large artificial mound called the kote. From this point the slope towards the walls on the north and west sides is gradual and unbroken; to the east and south it is precipitous, the streets are hollowed out and formed into ravines by the course of the water. This is the most impracticable part of the town, for the streets are very narrow and a large portion of the houses are lofty brick buildings. But the water runs off so rapidly that immediate attention to the drainage of this portion was the less necessary. The line of drainage therefore starts from the head of the old main bazar on the western side of the kote, and runs through that bazar to the point where it enters the grain-mundee. Here the new street crosses it at right angles, and the whole of this drainage is conveyed southwards through

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the mundee and Smith Gunge into the main drain at the Delhi Gate. The rest of the drainage of the newly-widened and paved streets escapes into the main drain at the Kumbo Gate, and at the Khyrnuggur Gate by a masonry drain running outside the city wall. All these drains are of semicircular shape and of good masonry, as are all their falls or inlets into the main drain. In order to make the roadway of the streets correspond with the drainage levels, it has been necessary in most places to take up the metalling and replace it. The large grain-mundee has been metalled throughout and thoroughly drained. The people have at once undertaken to suit their shops in appearance to the improved condition of the mundee. New shop-fronts have been built, and all chuppers are being rapidly removed. I have also had to rebuild a masonry drain at the Lussaree Gate, for the more effectual exit of the drainage to the south of the city at that point.

15. The total cost of all these city improvements amounts to Rs. 7,478-15-2, in the following proportions:—

Masonry drains at	Rs. 14 2 4 per 100 cubic feet,	Rs. 4,603	7 9
Metalling and excavation at	„ 1 0 9 per ditto,	„ 2,874	15 9
	Total, ...	Rs. 7,478	7 6

16. *Miscellaneous matters connected with the above.*—A large piece of ground between the present Huzzoor tehseel kutcherry and the town wall, near the Lussaree Gate, had been hitherto crowded with unsightly huts, shutting out the approach to that kutcherry and rendering that quarter excessively filthy. I wished to purchase this land from the owners, and had begun to treat with them for it. But natives in general, and especially Mahomedans, have a prejudice against selling their ancestral property; they preferred giving it up on the condition that they were to be allowed a certain space on two sides of the ground in question for building fronts to a line of shops, and that if ever the land was no longer required by Government it should again be given up to them. This bargain has been

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concluded, the huts removed, the city wall knocked down, and a large open space cleared in front of the tehseel kutcherry, looking towards the station. On part of this ground the foundations for the tehseeldars' and peshkars' houses are laid. There is also ample room for the site of a school house which I hope to build. The material is all ready.

17. Lanterns have been made up and distributed throughout the main street, mundee, and Smith Gunge, and this part of the city is now lighted nightly except during moonlight. The cost has been Rs. 100-13-0, which I request may be defrayed from the surplus Chowkeedaree.

18. I took advantage of the making of the main drain to open out a road partly along its bank from the Delhi Gate to the junction of the Haupper and Gurhmuktesur roads. A road of the kind existed under the city wall, which was much travelled in dry weather, as it led from the roads just mentioned to the Ganges and the Delhi and Baghput roads, and the Sudder Bazar. But in wet weather the drainage of the city swept across it and rendered it utterly impassable. The present line will become one of great general convenience, and should be metalled as soon as practicable. The cost will I presume be defrayed from the Ferry Funds.

19. I append an abstract of income and expenditure on account of the Nuzzool Fund :—

Total income from sale of Nuzzool property up to present date, ...	Rs.	31,217	0	0
DEDUCT.				
Already sanctioned for opening out new street,	„	7,560	15	0
Already expended in drainage and metalling city streets and bazars, ...	„	*7,478	7	6
Half cost of main drain defrayable by Nuzzool Funds,	„	8,529	14	0
		23,569	4	6
In hand, ...	Rs.	7,647	11	6

* By orders of Government No. 1857 of 18th April, 1854, Rs 5,000 were sanctioned for the work.

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The Nuzzool resources are not yet quite exhausted, as I find there is still property belonging to Government which I think may realize from Rs. 7,000 to 10,000.

20. Much remains to be done before the work of general and local drainage can be carried out in all its details:—the escapes of the water in the low lands on the eastern side of the city have to be worked out; the numerous foul, narrow drains and cesspools in the streets of the city have to be broken up and laid down anew. A commencement has been made, and the main drain has been completed. The subordinate drainage will naturally work out toward this if it only meets with fair encouragement and attention hereafter.

21. For the successful carrying out of the works that I have been describing, the merit of the plans as well as their completion is due to Mr. Read, of the Ganges Canal Department. By myself, and without his valuable aid, I could have done nothing even towards the improvement and partial drainage of the city. In every part of the works his assistance has been required and readily given—in working out the line of a street, in taking levels, in drawing plans, checking accounts, and correcting the errors of the native superintendents. At all times he has come into Meerut from his immediate duties, and frequently from long distances, to supervise the works, and by his knowledge of prices of material and rates of labor has kept down the cost of the works to the lowest possible amount. I beg to send a report from him on the subject of these works, together with his accounts, showing the rate of cost according to measurement. I have already in my reply to your predecessor's letter No. 27, Circular of the 8th August, 1854, mentioned the mode of remuneration which I recommended for any officer of another department employed in carrying out the public works of these districts. I know not whether the subject is still under consideration. Mr. Read may be held deserving of

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some recompense—if not for his successful labors, at any rate for actual expense of travelling entailed on him by his frequent journeys to the works from his duties on all parts of the canal.

22. I beg to recommend a reward of Rs. 100 for Mr. Dodsworth's two assistants, who took out the large range of levels of the country east of the Aboo Nullah. These measurements entailed great labor and were found most accurate.

23. The works carried out by Captain Cookson in the Sudder Bazar and cantonments are not properly within my cognizance, and that officer will no doubt report on them. I will only observe in connection with the general plans of drainage that immense improvement has been effected and that they have been admirably carried out by him.

24. *Meerut Dispensary.*—This building was undertaken early last year from the money subscribed for this purpose by the inhabitants of the town and district, amounting to Rs. 6,210-13-3. It was commenced on a plan of my own, under the superintendence of the Jailor and by the aid of prisoners, but was so badly put together that I was obliged to claim the assistance of Mr. Read to rebuild the greater portion of the work and complete it perfectly. It is a high, oblong building, having three compartments—a centre room and two side wards. The walls are built of *pisé*, with a masonry coping 1 foot high for the support of the roof. The roof with its ventilator is constructed with lattice beams from a model given me by the Magistrate of Bareilly. It is covered with flat tiles, overlaid with a coating of lime. There are two verandahs, one at the back and the other at the front, both of masonry, and the latter 14 feet broad. A plan and section of the building is appended. The cost up to this date has been Rs. 5,682-8-1. Houses for the Sub-Assistant Surgeon about to be appointed by Government and for the servants of the establishment

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are in course of construction. The average of daily attendance of patients during the last four months has ranged from fifty to ninety.

25. *Gunge at Bhagput.*—This market is built on the site of the old Bhagput tehseel, which was done away with in 1852-53. I disposed of the land, which is of great extent and in the centre of the bazar, to the mercantile community in lots for the purpose of building shops. The amount realized was Rs. 9,004-5-6, for sixty shops at various prices. It is now surrounded with large brick-built shops with upper stories, built at considerable cost, and is much frequented, as the gunge is now the centre of the mercantile business of the town. It has three gates, one leading to the bridge of boats and the other two to the bazars. Although this gunge has cost nothing to Government and no labor has been expended on it from any local funds, it claims its place in this report from its importance and from its being a Government site devoted to a good local purpose.

26. The serai at Mooradnugger has been put into thorough repair, in obedience to the orders of Government, No. 315 A., of the 14th March, 1854, at a cost of Rs. 701-15-0. The account is herewith furnished.

II.—*Report on the Meerut Drainage.*—By F. Read, *Superintendent, Upper Central Division, Ganges Canal.—Sirdhannah, the 3rd August, 1853.*

Having been requested by the Government, North-Western Provinces, *vide* Mr. Secretary Muir's letter No. 1857, dated the 18th of April, 1854, to the address of C. C. Jackson, Esq., Commissioner of the Meerut Division, to superintend the execution of the main line of the Meerut drainage and works attached, I now that the works are finished have the honor to forward for the information of Government my report on the same, to which I have attached a separate report on the internal surface drainage

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of the city of Meerut, executed in conjunction with the Collector of that city.

2. With the view of saving Tank A. (situated at the head of the main line of drainage) from future ingress of filth from camel sheds and cantonment bazars, and also with a view of connecting the cantonment with the main drainage, the space between hitherto having been a hollow in which stagnant water continually lay, it was thought advisable to fill in this depression and also clear out the sides of the tank and make it of a rectangular form, with neatly-dressed slopes. This has been done (*vide* Sheet I.). The cost of it should be debited to the cantonment drainage, as the tank is situated within its limits. I have given in (Bill No. 1) the detail of expenditure the cost under a separate heading ; the item can therefore be readily transferred.

3. The main line of drainage commencing from the Tank A. is carried out on the data fixed by Lieutenant-Colonel R. B. Smith in his letter to Government No. 2825, of the 21st March, 1854, and on the modified plan recommended by Mr. C. C. Jackson in his letter No. 22 of the 13th February, 1854, and consists of two sections,—the first commencing at Tank A., with a general depth of 5·86 feet of digging, thereby leaving the bed of tank 6·77 feet below the mouth of drainage cut. This line runs direct to the north-west corner of the city wall, where it meets a depression on the surface of the ground which during the rains, and in fact nearly through the whole of the cold season was a filthy pool of stagnant water. This depression has been entirely filled up with earth procured from some rising ground conveniently situated in its immediate vicinity, and the outlay has been Co.'s Rs. 356-8-8 (*vide* Bill No. 1). From this point the drainage cut continues parallel with the city wall, and as its bed is considerably below the surface of the ground it renders the internal drainage of the city compara-

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tively an easy process; and numerous small culverts have been constructed, so as to connect the drainage of the different streets with this main drain, and for this purpose the city wall had to be perforated in several places and pierfalls constructed at the points of junction. This section terminates at the south-west corner of the City, near the Delhi gate, and at Tank B. The total length is 6,300, and has a slope of bed equal to 2·38 feet per mile, with a bottom of 6 feet and side slopes equal to 1½ to 1.

4. The masonry works along this section are five in number, consisting entirely of bridges, and the cost of masonry and earthwork of this section will be found under their different headings in the abstract of expenditure of Bill No. 1, attached to this report.

5. The second section commences from Tank B., proceeds in a direct line to the east Kalee Nuddee, to a point marked H. in the accompanying map. The quantity of work on this line has been somewhat increased in comparison with the original design, in which it was merely contemplated to carry a cut direct to the East Kalee Nuddee for the free egress of water; however, on subsequent inspection it was found necessary to embank for a considerable distance below Tank B., as the cut runs through several deep depressions. Though the bed of channel is lower than the depression in question, yet the material for making the embankment was insufficient, and external superficial diggings had to be resorted to for this purpose, the cost of which is included in the main channel digging; and in addition to this, a road 40 feet in width has been attached to the right bank of channel from the Delhi Gate to Bridge No. 8 (*vide* Sheet I.) of this section. This road is on a level with the top of bank; indeed it constitutes the bank itself, and is consequently raised high above the surface of the country. The object of this road being to connect the west portion of the city with the

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traffic from Gurhmuktesur, the cost of construction does not come into this bill.

6. Tank B. (*vide* Sheet No. II.) has been considerably reduced in its dimensions by Mr. Wylly filling into it the large unsightly brick-kilns in its immediate vicinity. The work was executed I believe by prison labor, and the cost therefore does not appear in the bill. As the bed of the drainage channel is on the same level as that of the tank, and as a masonry inlet into the former has been constructed (*vide* Sheet No. III., fig. 1), the drainage of the tank is readily provided for. The longitudinal section of the main lines of channel will show the various depths at different points. The length of this section is four miles and 2,700 feet, and has a slope of bed equal to eighteen inches per mile; the width of channel at bottom is seven feet, and side slopes have been given one and a half to one.

7. The masonry works on this line, eight in number, consist of bridges and inlets. Many of the former are of considerable size, and consequently expensive in proportion—the askew bridge on the Haupper road in particular, the angle of which being 28°, rendered it necessary to provide extended wing walls (*vide* plan of this work fig. 6, Sheet III.).

8. Sheet No. III. shows plans and sections of every masonry work constructed on the main line of drainage; the number corresponds with those given on the face of Sheet No. I., and the cost of each is likewise detailed in the bill, and the measurements connected with the same show the cubic contents of masonry in each work.

9. I would strongly recommend that the repairs of the main line be annually executed. This is essentially necessary to ensure a free egress of water, and these repairs would probably not cost less than Rs. 50 per mile. The great object to look to will be the clearing out of the bed, which necessarily must after the rains be in a measure silted up, and in localities where the excavation is

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great impeded by the falling in of the banks. The masonry works along the line having thin floorings laid, the correct level will act as regulating bars for the slope of bed, and levels taken between any two such points will at once show the state of the bed of channel. I would also recommend that wherever it was found desirable to make an inlet into the main drain that the said inlet should be a masonry one, and that no drainage should be allowed to enter the main line except at such points ; or should future circumstances show that it is desirable to connect any local drainage with the main line, that the point of junction should in all cases be protected by masonry revetments or overfalls. That the inhabitants of the city will and do take advantage of the deep cutting in the vicinity, experience and observation have already shown ; but as their method is simply to perforate a hole through the city wall for the egress of the water they wish to get rid of, the consequence naturally results in a deep ravine forming in the bank and slope of the main line, and in all probability the channel would be seriously interfered with. And as there are many of these kutcha inlets along that portion of the main line extending round the city, I would recommend that they be connected as much as possible and that masonry inlets be constructed immediately after the present rains.

10. I regret exceedingly that through the gross neglect of the Superintendent of Roads, to whom the construction of an askew bridge of considerable dimensions (*vide* fig. 6, Sheet III.) was entrusted, I have to record the failure of any portion of this project, which with this solitary exception has stood the test of the late severe rains and fully answered the expectations entertained of its efficiency. The work above alluded to is situated on the Grand Trunk Road to Haupper and where the channel meets the road at an angle of 28°, and therefore entailed on me the necessity of building an askew bridge, the arching of which of all others required the best of workmanship. The prin-

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ciple on which the bridge is built is similar in every respect to those constructed by me on the canal works, and with success in every instance. The construction of the arch is in itself simple, being merely the layers laid at right angles with the face of the arch and the abutments cut into steps to resist the pressure. This was fully carried out by the Superintendent, but unfortunately the masonry was built without the slightest attention being paid to dressing of the bricks or backing them regularly. The mortar used was indifferently mixed, and the thickness of the seams treble what they ought to have been. Under these circumstances it is not at all to be wondered at that the whole structure should have given way. The work was being built when the monsoons commenced, and I suppose that the Superintendent, in his endeavours to get it finished before any very heavy fall of rain, hurried on the work without paying the slightest regard to the quality. A temporary wooden bridge over the channel has been constructed in the vicinity of the ruin, and therefore the traffic has been in no way interfered with. Measures have already been taken to collect material for the re-construction of the work as soon as the state of the weather will permit, and as the bricks have all been recovered I anticipate that the cost will be about Rs. 1000.

11. By comparing the total cost of the excavation of the main channel with the original estimate submitted by me, the difference in proportion is trifling. The width of the channel at bottom was originally 15 feet, and entailed an expenditure of Co.'s Rs. 16,128-8-4. The modified plan on which the work has been constructed gives a width of channel at bottom of 6 feet for the upper section and 7 feet for the lower ; and the cost, exclusive of filling in tanks and hollows, has been Co.'s Rs. 9,299-9-7, and the difference is accounted for by the area of section being increased by adopting extended slopes of 1½ to 1, instead of ½ to 1.

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12.—The comparison of cost of masonry works of bridges with the estimate is not so satisfactory: the cost exceeds the latter. In fact the original estimate was made without any previous examination of the localities where they would be required, and they exceed in number, and considerably in cubic contents. I have however given in Sheet No. III. plans and sections of each work constructed; and in the bill of expenditure will be found the measurements of each different work, showing exactly what it has cost, and also the rate at which it was executed. These rates will, I think, be found satisfactory, and comparisons can only be made by these, as it was at the time when the original estimate was made out found impossible for want of opportunity to make out a correct estimate.

13.—The line of drainage has now for some time been opened out, and the frequent and heavy falls of rain have given us ample opportunities of forming some opinion as to the merits and defects in the project; and in my opinion I consider the object desired has been fully attained. The different tanks and low swamps in the vicinity of Meerut have been effectually, though slowly, drained, and the Sudder and Cantonment Bazaars, and also the city, have radiated their lines of drainage into the main trunk; and as stated by Colonel Smith the volume of water that would be admitted into this main line would require an adequate capacity of channel; and although the width of earthen and masonry channels into the immediate vicinity of Meerut is ample, yet it is obvious that below the second mile the egress of the water through the different masonry channels is not so free as it should be; the consequence is that for many hours after any continued and heavy fall of rain the upper channel is full almost to overflowing, and it only subsides by slow degrees. There is no difficulty in at once tracing the cause to the fact that the masonry and earthen channels should have increased in capacity as they proceeded onwards, for although the

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width of channel amply provides for the free discharge of drainage in the locality of Meerut, yet it was omitted in the original design to provide for the drainage of the line of country intercepted by this deep cutting, and which naturally tends to drain off all the water that would otherwise have found some other vent. This I have observed at three different points, and some future arrangement must be made regarding the formation of masonry inlets of adequate dimensions, for the body of water so admitted is considerable and is the cause of the only defect in the project; and as there were no cross sections taken of the country between Meerut and the Kalee Nuddee, it was almost impossible to have anticipated this contingency. The masonry works having all been built, it is now too late to rectify this oversight except in re-constructing the askew bridge under the Haupper road, which has a long masonry channel, and I will take the precaution of adding a couple of feet to its width of waterway.

14.—The only detriment that this has occasioned is, that the drainage water takes longer to discharge itself into the Kalee Nuddee than it otherwise would have done had the lower masonry channels been rateably increased in width as they advanced towards the Kalee Nuddee.

III.—Report on the Internal Drainage of the city of Meerut.

1.—In conformity with the instructions of Government contained in Mr. Secretary Muir's letter, No. 1857, of the 18th April, 1854, the internal surface drainage of this city was placed in the hands of Mr. Wylly, the Magistrate, and at his request I assisted him in carrying out the project; and as it is immediately connected with the main line of drainage, I had in my possession accurate data to work on, and I herewith submit the accompanying map of the city, (Sheet No. II.) which will explain the lines of thoroughfares opened out, metalled, and drained.

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2.—The first object to be gained was to open out a commodious thoroughfare through the city, which at the period when operations were first commenced were all so confined that it was with difficulty a cart could penetrate any distance into the city, and few willingly incurred the risk of driving a buggy into the narrow, tortuous, and filthy streets. After carefully examining the different localities, it was determined to open out a main line of communication, commencing from the Khyrnuggur Gate and proceeding in as direct a line as possible (*vide* No. 2 in Map of City) to the Delhi Gate. This line has many advantages, insomuch as it opens out a direct communication with the Delhi road, and also renders the extensive pucka gunje (termed Smith's Gunje) accessible, which hitherto has been nearly uninhabited; and now that the communication above alluded to has been opened out, this part of the city shows palpable signs of improvement and prosperity. Another locality that has received considerable benefit by this main street is the grain mart, marked C. in sheet No. II.; the size has been materially increased, the bunneahs' chubootras in front of their shops have been raised one foot, and the enlinement carefully preserved, and all unsightly buildings formerly standing in the centre of the mart, much to the impediment of business, have been removed, and kunkur has been laid down and the drainage carefully arranged. The cost of the works connected with this line is given in bill No. 2. The length of the street is 3,975 feet, and the measurement of each description of work is also given, with rates, &c. I have also given an average section of the street, showing the masonry saucer drains on either side (*vide* Sheet No. II.), and the height the centre of metalled road is raised. The masonry culverts and under-drains are so small and numerous that I did not think it worth while giving detailed plans of them, but full measurements of all the masonry works will be found in appendix to bill No. 2.

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3.—The next line of importance is that marked No. 1 in map of Meerut, and the levels of which connect the drainage of the main street with the main channel; and in place of the broad deep ditch that formerly ran along the foot of the city wall, and which reduced the width of the crowded thoroughfare considerably, a saucer drain has been substituted, and the whole remaining width of road metalled.

4.—No. 3 line, branching off from the main street and terminating at the Khumboo Gate, opens out a broad thoroughfare from the sudder bazaar to the city, and also renders accessible the dispensary, which is situated in the immediate vicinity. The street has been considerably widened, the whole area metalled; a broad saucer drain has been attached to one side of the street and carries off the drainage from the main line, and terminates in an overfall into the drainage channel outside of the city wall; the arrows in Sheet II. denote the direction the drainage takes.

5.—No. 4 is a branch line extending from the grain mart to the kotwallee. This street has not been widened to any great extent, merely the platform and verandahs in front of the shops having been reduced in width; the shops are so closely packed that it was found impracticable to interfere with them without causing greater damage than the occasion demanded. The throughfare is, however, considerably improved, and as the whole width between saucer drains has been metalled, the traffic is in no way impeded. The drainage of this street from the kotwallee runs towards the grain mart, and crosses it by a broad but shallow pucka saucer drain, and empties itself into the main drainage cut at a point marked × in Sheet No. II. The line, however, from the grain mart to the drainage cut has not been made pucka. This should not be lost sight of, as a considerable body of water passes down this escape line, and if silted up will in all probability derange the levels of the drainage about it.

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6.—No. 5 has opened out a portion of the city which has hitherto for want of ingress and egress been avoided by the respectable description of tradesmen ; in fact more than half the place seemed uninhabited, and when the work was first commenced it had more the appearance of a dirty kutcha surai than a pucka building. The drainage was totally neglected, and filth of every description allowed to collect in heaps in the unsightly ditches on either side of the street, if such it could be termed. The first thing to do to rectify this was to attend to the levels of the streets with respect to the main line of drainage cut, and as the fall was found to be ample and a masonry saucer drain was built on one side of the street, and empties itself into the main drain at points FF. (*vide* Sheet No. II.), the whole area of these streets have been metalled, and the projecting straw verandahs demolished. The appearance has therefore undergone a considerable improvement for the better, and I am of opinion that this locality will some short time hence become much sought after by wealthy shopkeepers.

7.—The total cost of opening out drainage and paving these five lines of communication will be found in bill No. 2, and amounts to Co.'s Rs. 7,478-7-6. I have given in considerable detail the measurements and rates of the different descriptions of work executed, and which I trust will be found satisfactory; and as the efficient drainage of these lines have been carried out, I conclude that the object anticipated has been fully gained.

8.—In conclusion, I would beg respectfully to suggest that adequate arrangements be made to preserve the saucer drains, which now act as a net-work of drainage, free from filth or other extraneous matter, which, if allowed to collect in these shallow escapes, will cause a complete stagnation of the drainage water. The future success of this project depends in a great measure on the above being rigidly enforced, and I would further sug-

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gest that no kütcha foundation for a house or enclosure should be allowed to be built on the edge of the saucer drain, for if this is permitted the earth that is usually sloped against the foot of walls of this description would inevitably be washed more or less into the drain; but as ground is valuable within the city, I would suggest that any person in future wishing to build a wall on the edge of the saucer drains should be compelled to build the foundations pucka, and also one foot above the plinth or upper edge of masonry drain. With the aid of such ordinary precautions, I think that the permanent efficiency of the internal drainage of the city will be ensured.

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BILL No. 2.

THE HON'BLE COMPANY, ———————————————— DR.

To the following expenditure incurred in constructing works for the internal Drainage of the City of Meerut, sanctioned by His Honor the Lieutenant-Governor, North-Western Provinces, vide Mr. Secretary Muir's Letter, No. 1857, dated the 18th April, 1854.

Sirdhanah, 3rd August, 1855.

No. of Works.	Quantity of Work Executed.	Description of Expenditure.		Amount.	Total.
		Expenses incurred in constructing Works for the internal Drainage of the City of Meerut.			
		To cost of work-people, ...		3089 15 9	
		To cost of materials, ...		4388 7 9	
					7478 7 6
		AVERAGES COVERING THE ABOVE EXPENDITURE.			
1	4709·3″	Cubic feet pucca masonry in saucer drains, &c., @ Rs. 14-12-4 per 100 cubic feet, ...	695 8 11		
				695 8 11	
2	1830·3″	Cubic feet pucca masonry in saucer drains, &c., @ Rs. 14-12-4 per 100 cubic feet, ...	2663 2 10		
	145540·9″	Superficial feet metalling road, &c., 4 in. thick, @ Re. 1-0-9 per 100 superficial feet, ...	1544 9 0		
	217142·	Cubic feet excavation in building road, @ Re. 1-8-5 per 100 cubic feet, ...	331 5 9		
				4539 1 7	
3	2990·6″	Cubic feet pucca masonry in saucer drains, &c., @ Rs. 14-12-4 per 100 cubic feet, ...	441 10 5		
	16660·	Superficial feet metalling road, &c., 4 in. thick, @ Re. 1-0-9 per 100 superficial feet, ...	174 6 8		
	24990·	Cubic feet excavation in building road, @ Re. 1-8-5 per 100 cubic feet, ...	38 0 3		
				654 1 4	
4	1884·2″	Cubic feet pucca masonry in saucer drains, &c., @ Rs. 14-12-4 per 100 cubic feet, ...	278 4 6		
	28120·	Superficial feet metalling road, &c., 4 in. thick, @ Re. 1-0-9 per 100 superficial feet, ...	294 6 3		
	56240·	Cubic feet excavation in building road, @ Re. 1-8-7 per 100 cubic feet, ...	86 8 0		
				659 2 9	
5	3556	Cubic feet pucca masonry in saucer drains, &c., @ Rs. 14-12-2 per 100 cubic feet, ...	524 13 1		
	37830	Superficial feet metalling road, &c., 4 in. thick, @ Re. 1-1-2 per 100 superficial feet, ...	405 11 10		
				930 8 11	
		Total, ... Co.'s Rs.	... ...	... ...	7478 7 6
		ASSETS TO ACCOUNT.			
		To cash received from the Collector of Meerut,	... ...	7478 7 6	
		By cash expended, being the amount of this Bill,	... ...	7478 7 6	
		Grand Total, ...Co.'s Rs.	... ...	... ...	7478 7 6

I do hereby declare upon my honour that the sums charged in this bill have been duly expended for the purposes set forth.

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Measurements of Works executed in the internal Meerut City Drainage.

Sirdhanah, 3rd *August,* 1855.

No. of Works.	DESCRIPTION.	L.	B.	D.	No.	Cubic Contents.	Total.	Total.	Grand Total.
1	*Masonry Saucer Drains, &c.*								
	Arch through the city wall, ...	18	7·	1·6	3	567·			
	Arch through the platform of gate, ...	16	4·	1·6	1	96·			
	Side walls through the city wall, ...	18	2·6	1·6	6	405·			
	Filling in spandrills with masonry, ...	8	5·	3·	6	720·			
	Side walls through the platform of gate,	16	1·	2·6	2	80·			
	Saucer drain under the city wall, ...	506	6·3	0·6	1	1581·3			
	Ditto from the city wall to drainage cut, ...	126	2·	1·	1	252·			
	Ditto wall of ditto, ...	126	2·	2·	2	1008·	4709·3		
2	*Masonry of Saucer Drains, &c.*								
	Brick-on-edge flooring, Khyrnuggur Gate,	46	14·6	1·4	1	889·4			
	Side walls of ditto, ...	42	1·	2·	2	168·			
	Saucer drain at ditto, ...	16	2·6	1·	2	80·			
	Ditto from new gate to road, ...	275	2·6	0·6	2	687·6			
	Ditto from Khyrnuggur to Kumbhoo Gate, ...	1654	2 6	0·6	2	4135·			
	Ditto from ditto to ditto, ...	24	2·6	1·6	1	90·			
	Ditto from new gate to Mundi, ...	755	2·6	0·6	2	1887·6			
	Ditto from Bazar to Kotwallee, ...	22	4·	1 6	1	132·			
	Ditto from Bazar to Mundi, ...	60	4·	1·6	1	360·			
	Ditto in Mundi, ...	244	6·	1·6	1	2196·			
	Ditto from Mundi to Gunje, ...	645	2·6	0·6	2	1612·6			
	Arch over the flooring of Musjid at Delhi Gate, ...	4	2·6	0·9	4	30·			
	Side walls of ditto ditto, ...	3	2·6	1·6	4	45·			
	Saucer drain through ditto, ...	2	2·6	1·	4	20·			
	Arch through the city wall, ...	11	5·	1·	2	110·			
	Saucer drain from Gunje to Delhi gate,	873	2·6	0·6	2	932·6			
	Ditto for cart passage, ...	15	1 6	0·6	1	11·3			
	Ditto for ditto thorough new gate, ...	50	1·6	0·6	1	37·6			
	Ditto on the road to the Tehseel, ...	23	1·6	0·6	1	17·3			
	Ditto on the road to Sheesh Mahul, ...	12	1·6	0 6	1	9·			
	Ditto on the road to Dewan Khana, ...	15	1·6	0·6	1	11·3			
	Ditto on the road to Moomtaz Ali Khan's house, ...	16	1·6	0·6	2	24·			
	Ditto on the road to Kanoongo Mohulla,	26	1·6	0·6	1	19·6			
	Ditto on the road to Thaili Mohulla, ...	17	1·6	0·6	1	12·9			
	Ditto on the road to Abdool Kadir's house, ...	18	1·6	0·9	1	20·3			
	Ditto to road to Kumhboo Gate, ...	22	1·6	0·9	2	49·6			
	Ditto to road near the Tehseel, ...	26	1·6	0·9	1	29·3			
	Ditto to road to Serai from Bazar, ...	10	1·6	0·9	2	22·6			
	Ditto to ditto ditto, ...	14	1·6	0·9	1	15·9			
	Ditto to road from Gunje to Serai, ...	20	1·6	0 9	1	22·6			
	Ditto to ditto ditto, ...	17	1·6	0·9	2	38·3			
	Ditto in Mundi, ...	224	2·6	0·6	2	560·			
	Ditto from Kumbhoo Gate to Khyrnuggur, ...	1590	1·5	1·	1	2385·			
	Carried over ... Cubic Feet,					16660·10	4709·3		

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Measurements.—(Continued.)

No. of Works.	Description.	L.	B.	D.	No.	Cubic Contents.	Total.	Total.	Grand Total.
	Brought forward, ...Cubic Feet.					16660·10	4709·3		
2	*No. 1 Culvert at Khyrnuggur Gate.*								
	Flooring, ...	50	2	0·4	1	33· 4			
	Side walls, ...	50	1	1	2	100			
	Arch, ...	50	3	0·9	1	112· 6			
	Wing walls, ...	20	1·6	1	1	30			
	Ditto, ...	40	1·6	1	1	60			
	No. 2 Culvert at Kumbhoo Gate.								
	Flooring, ...	27	2	0·4	1	18			
	Side walls, ...	27	1	1	2	54			
	Ditto, ...	27	1	0·9	1	20· 3			
	Arch, ...	27	3	0·9	1	60· 9			
	Wing walls, ...	12	0·9	2	2	36			
	Spandrills, ...	27	1·6	1·6	2	121· 6			
	No. 3 Culvert at Kumbhoo Gate.								
	Flooring, ...	20	2	0·4	1	13· 4			
	Arch, ...	20	3	0·9	1	45			
	Side walls, ...	20	1	1	2	40			
	Wing walls, ...	20	1	1·6	1	30			
	Ditto, ...	10	1	1·6	1	15			
	No. 4 Culvert at Mundi.								
	Flooring, brick-on-edge,... ...	33	2	0·4	1	22			
	Flooring, ...	33	2	0·2	1	11			
	Arch, ...	33	3	0 9	1	74· 3			
	Side walls, ...	33	1	1·	2	66·			
	Ditto, ...	33	1	0·6	2	33·			
	Spandrills, ...	33	1·6	1·6	2	148· 6			
	Wing walls, ...	20	0·9	2·	1	30·			
	No. 5 Culvert at Mundi.								
	Flooring, ...	16	2	0·2	1	5· 4			
	Side walls, ...	16	2	0·4	1	10· 8			
	Ditto, ...	16	1	1·	2	32			
	Ditto, ...	16	0·9	1·	2	24			
	Arch, ...	16	3	0·9	1	36			
	Wing walls, ...	10	0 9	2	1	15			
	Spandrills, ...	16	1·6	1·6	2	72	18030· 3		
3	*Masonry of Saucer Drains, &c.*								
	Saucer drain at Kumbhoo gate, ...	446	2·6	0·6	1	557·6			
	Ditto from gate to drainage cut, ...	150	5	1	1	750·			
	Ditto from ditto, ...	150	1·6	1·6	1	337·6			
	Ditto from ditto, ...	150	1·6	1.6	1	337· 6			
	Ditto from ditto, ...	90	5	1	1	450			
	Ditto from ditto, ...	90	1·6	1·6	2	405			
	Ditto slope into ditto,... ...	6	3	1·6	1	27			
	Arch over saucer drain ditto, ...	15	2	1	1	30			
	Slope of ditto ditto, ...	8	4	1·6	1	48			
	Slope of ditto ditto, ...	8	4	1·6	1	48	2990·6		
	Carried over... ...Cubic Feet,						25730		

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Measurements.—(Continued.)

No. of Works.	Description.	L.	B.	D.	No.	Cubic Contents.	Total.	Total.	Grand Total.
	Brought forward ...Cubic Feet,						25730		
4	*Masonry of Saucer Drains, &c.*								
	Saucer drain from Bhaugput to Haupper gate, ...	722	2·6	0·6	1	902·6			
	Ditto on a road to ditto, ...	37	1·6	0·9	1	41·8			
	Drain at Nusseri Gate flooring, ...	10	3	2·6	2	90			
	Ditto, ...	15	10	3	1	450			
	Side wall, ...	32	2	1·6	1	96			
	Flooring, ...	32	4·6	1	1	208			
	Parapet walls, ...	33	2	1·6	1	96	1884·2		
5	*Masonry of Saucer Drain, &c.*								
	Saucer drain from Mundi to Kotwallee, ...	1422	2·6	0·6	2	3555	3555	31169·2	
	Grand total cubic feet of pucca masonry executed, ...								31169·2
2	*Metalling Road 4 in. thick.*								
	From Khyrnuggur to Delhi Gate,	3975	29·3	0	1	116268·9			
	Old Mundi, ...	176	172	0	1	30272			
	Sundry roads.	10	10	0	10	1000	147540·9		
3	*Metalling Road 4 in. thick.*								
	From Chouck to Kumbhoo Gate,	476	35	0	1	16660	16660		
4	*Metalling Road 4 in. thick.*								
	From Bhaugput to Haupper gate,	740	38	0	1	28120	28120		
	Metalling Road 4 in. thick.								
	From Mundi to Goozri, ...	1455	26	0	1	37830	37830	230150·9	
	Grand Total Superficial Feet of Metalling executed, ...								230150·9
2	*Excavation of Earth in levelling Road.*								
	Earth excavated, ...	1200	30	2	1	72000			
	Ditto ditto, ...	1500	25	1·6	1	56250	128250		
	Filling in earth at Mundi, ...	176	172	2	1	60544			
	Ditto at the Delhi Gate, ...	373	38	2	1	28344	88892	217142	
3	*Excavation of Earth in levelling Road.*								
	Filling in earth along the road,	476	35	1·6	1	24990	24990	24990	
4	*Excavation of Earth in levelling Road.*								
	Filling in earth along the road,	740	38	2	1	56240	56240	56240	
	Grand Total Cubic feet of Earthwork executed,... ...								298372

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No. 16.

From Captain J. C. Brooke, *Officiating Deputy Commissioner, Ajmere, to* General G. Lt. P. Lawrence, *Officiating Commissioner, Ajmere, Mount Aboo, No. 158 of 1858.—Dated the 24th July, 1858.*

Sir,—I have the honor to report, for the information of the Government, North-Western Provinces, the result of my late tour through the districts of Ajmere and Mhairwara.

2. It has been my endeavour to make myself as well acquainted with the statistics of my charge as the short period I have been acting in this office has enabled me, and I trust that this circumstance may excuse any shortcomings in my report, as I feel the difficulty in which I am placed in succeeding one who year by year was accustomed to lay before Government the history of his administration, which has yielded results conducing as much to the benefit of Government as to the happiness of the people.

3. Following therefore the late Commissioner's plan of recording first the character of the season, I would observe of the last Monsoon, that the complaint was not the usual one—that there had been a deficiency in the supply of the element on which the well-being of these districts so much depends—but that there had been a very great superfluity. The average fall at Ajmere and Nya Nugger may be taken at 15 inches; whereas, during last season the fall was 23 inches. This fall, too, was not so partial as usual, excepting in a few villages in Mhairwara where there seems to have been a succession of deficient years; whilst all the rest of the country has been inundated, the supply of rain was very much more than was needed or desired. The tulaos were filled to overflowing, the roads were impassable for a long time, and much of the land was submerged with water, so that the khurreef crop was an entire failure.

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4. The Rubbee harvest was remarkably plentiful, and went far to compensate for the deficiency in the khurreef —more particularly where the land had not suffered from saline exudations. The soil in some parts, and especially in the Ramsur district, is peculiarly subject to this misfortune. Large tracts here and there are quite barren, whilst nowhere does the ground produce a crop of decent grass—that sure index of a good soil. The only preserve of grass I saw was in the narrow strip of Kishnagurh that intersects the Ajmere district. In the whole of our own portion the uncultivated ground is bare, hard, and flat, or what is commonly called "oosur." The eye wanders over the wide expanse of waste, and with the exception of here and there a herd of antelope bounding along, the view is broken only by clumps, or rather long lines of trees, marking the positions of the tulaos built by Colonel Dixon, the bunds of which he was very careful to have sown with babool and other trees. The sale of these trees is intended to add to the fund for the repair of the bunds. The trees are now verging on full size, and if a portion is periodically cut down their value in a country where wood is scarce will be considerable. Hereafter, when the bunds have been once consolidated, I have no doubt the produce will go far to cover the expenses of current repairs.

5. The cultivators in the Ajmere and Rajgurh Pergunnahs of Ajmere are better off than those in the Ramsur Pergunnah. Some of the villages have an appearance of ease and comfort, whilst only a few are poor. In the Ramsur Pergunnah they are generally very poor. At Ramsur itself they are well off, because here there is a fine lake. Wherever a village possesses good, well-filled tulaos one is sure to find comfort; where this expectation has not been fulfilled it is otherwise.

6. One misfortune the people labour under arises from the very great want of cattle in the districts. The coun-

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try suffered severely from famine nine years ago, and during the drought of 1848 the cattle died in thousands, both in the district and in the countries where they were taken to graze. The consequence is that the deficiency of horned cattle is very perceptible, and it interferes with the labour of the agriculturists in several ways.

7. The only manure available for the fields is the deposit in tulaos. From the great scarcity of both forage and cattle, the little cow-dung procurable is made into cakes for sale (about 40 of which are sold at Ajmere and Nusseerabad for as much as an anna); there is therefore no chance of the fields being supplied with such a luxury, excepting for the more valuable and rare crops, such as roses, melons, &c.; even with the deposit from the tulaos it is thought sufficient to manure the fields once in three years. In the year they are manured the highest produce of barley in the very best lands irrigated from tulaos will be about 1,750 lbs. to the acre;—the next year the crop will perhaps run as high as 2,000 lbs.;—whereas the third year it will fall to 1,500, when the manure will be again applied. Unirrigated, moist, and low-lying lands are not manured or allowed to remain fallow. The produce from them (only barley and wheat) is so very various that each spot has its peculiar standing.

8. The Baranee lands, or those sown in the rains, are not manured, with the exception of Indian corn, which is chiefly grown in Mhairwara, the agriculture of which tract entirely differs from that of Ajmere. In poor soils the Baranee land is allowed to lie fallow every other year, or sometimes once in three years.

9. In the Ajmere district Indian corn is sown in those places only where, in case of a deficiency in the supply of rain, it can be watered; and as it is a crop that ripens early, another of wheat or barley may succeed it after re-manuring the land. Bajra and Jowar however, are, in the Ajmere districts, the staple khurreef crops; they require

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less water than Indian corn, and less manure, but ripening later, cannot be followed by a second crop. If there is no manure available for the land in which Indian corn has been sown in the khurreef, then gram or some kind of pulse generally follows it. Rice is also sown, but not extensively.

10. In the Mhairwara district, cattle, and especially buffaloes, are more numerous than in Ajmere. The people consequently have more manure, and can afford to give it to the land, as the hills yield them fuel. The same evil of the pressure of the water in the tulaos forcing up the impure soda to the surface is felt, but to a less degree than in Ajmere. Some tracts however, especially those near Nya Nugger, have suffered very much from this cause.

11. The rain crops in Mhairwara are Indian corn, rice, and the hill grains, such as màl, shawlee, bajree, &c. Cotton is also extensively sown in the northern portion of the district as it is in Ajmere, but to a less degree. It is planted very early, before the rains have the power of injuring the young plants, and so that it may be picked before the frosts set in. It is sometimes, but rarely, irrigated, the moisture near the beds of the tanks being quite sufficient to bring it to maturity.

12. As we go south, however, the crops become perceptibly richer. The Indian corn, in the rains, is better manured and yields a higher return. In the Rubbee, wheat and barley are most luxurious, and the poppy begins to appear in extensive fields. This is sown both in irrigated, and sometimes even in unirrigated land. I saw it in the latter, with heads as fine as the finest Malwa plants, so that I was quite struck with their size and beauty.

13. Towards Todgurh, or that portion of Mhairwara which belonged to Meywar, the poppy has within the last few years, since the settlement was made, become the principal crop. The face of the country being very hilly, and the Mairs being able to cultivate only the narrow gorges between the hills, whilst the population is dense,

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high cultivation has advanced with rapid strides. As each family owns only a very few beegahs of land, the holdings are cultivated with great care and made to yield the highest profit. The land revenue collected from Todgurh is less than 1 lakh, whilst I am informed the value of the raw poppy juice which was this year taken down to Palee and Meywar for sale was not less than 3 lakhs of rupees.

14. There is little doubt but that the cultivation of the poppy will spread into the northern parts of Mhairwara wherever the soil is fit for it. It has only lately been introduced into Todgurh by the poorer Mairs, who were accustomed to visit Meywar periodically for the sake of seeking service as labourers in the poppy-fields. They thus became acquainted with the culture, which they have transplanted into their own country. Sugar-cane and tobacco cultivation might be introduced with advantage into Mhairwara, for there is good soil, plenty of water, and no lack of manure.

15. In the western and northern portions of Mhairwara the country suffers from a paucity of population and is scarcely fit in many places for the settlement, to the introduction of which Colonel Dixon was averse. The land is divided among the aboriginal Mairs, by whom it is held on a bhyacharee tenure, exactly as prevails in the Agra district, as detailed in Mr. Mansel's settlement report. Perhaps half or a quarter of a village under an assessment of 500 or 600 Rs. will be a single individual's share. The assessment being high, if the proprietor does not cultivate every acre he becomes a loser, and for want of hands and cattle he can neither manure his land nor cultivate it properly. When under kham management, he had perhaps invited assamees from Meywar and Marwar, who were willing enough to settle as long as the payment of the revenue was proportionate to the produce; but a bad season drives these assamees out of the country, and the whole loss falls on the zemindar.

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16. Another cause for the poverty of the cultivators near Nya Nuggur consists in the action of the Civil Courts of the Province. The bunyas have obtained decrees against the cultivators with fatal facility. The execution of these decrees, enforced by dustucks, is a species of moral torture held constantly *in terrorem* over the poor. As most disputes are settled by punchayut, the bunyas in league with one another play into each other's hands, when they sit upon the punchayuts, and thus make the ignorant Mairs their victims. The Mairs regard it almost as a crime to appeal, and hence when the injustice is brought to light there is no redress. At the period of my visit the whole population was loud in their complaints of the oppression by these dustucks, which was causing serious discontent against the Civil Government of the Province.

17. The new Mhairwara regiment, by drawing away population, has also thinned the villages, whilst the sepoy cultivators object to pay their leases. Colonel Dixon, as Superintendent and Commandant of the Regiment, urged the men to cultivate the soil as well as perform military duty, arranging from their pay for the payment of their own revenue as well as that of their relations. The money thus paid for military service was laid out on the land, and was returned to the coffers of the State. Now it will be thrown away to the dolees.

18. Wherever the settlement is not light, the sepoys care nothing about their fields and endeavour to throw them up; but there is seldom anyone willing to take them, and many of the villages have not population sufficient to cultivate them. The coparceners object to being made answerable for the shares of those who have taken service with the State, who they consider ought not under the circumstances to entertain them. There are several such cases pending, and every probability of several more being brought forward. This throwing up the lease by sepoys is

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felt very much by those villages which have only 4 or 5 cultivators and more land than they know what to do with.

19. During my tour I was careful to examine the Putwarees' books. I found they were mere copies of the original settlement papers, and gave not the slightest information. Year by year they have been accustomed to do nothing more, and considered that when this copy had been made they had done their duty. This had been evidently never brought to the late Commissioner's knowledge by the Deputy Collector. No bach'h has been made since the settlement. Every cultivator consequently has been led to consider his revenue as an unvarying sum, and that it is a great injustice to demand more from him to make up the deficiencies by defaulters.

20. Again, there is no record kept either of the fields in cultivation during the current year or of those thrown out, or of new land turned up. When I wished to tabulate the number of years the fields under assessment but now covered with water had been in that state, there was nothing but the *ipse dixit* of the people to guide me, and I am unable therefore to furnish with any confidence this very necessary information. Besides this, there is no account kept of the shamilat land, or of the various cesses usual in the villages in this district, such as the tax on cattle, houses of non-cultivators, &c. There being no meeting of the villagers to settle the yearly bach'h on account of those whose crops have failed, the latter are obliged to borrow at exorbitant rates, and run into debt to pay their revenue. Any remissions received from the state are appropriated by the whole village, giving a very small modicum of relief to those really requiring it.

21. In Mhairwara, where the tenures are bhyacharee, the same want of accounts exists, and the office of putwaree is sought only to enable the holder as banker to receive the whole crop of the ryot in payment of his own debts.

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The revenue falls into arrears, and is only credited when the putwaree has sold the crop at an advance, whilst very frequently dustucks are issued in the village for the sum detained by the putwaree.

22. The putwarees in Mhairwara are worse paid than even in Ajmere, in consequence of the smallness of some of the villages, and the difficulty from their distance apart of doubling two or three together. There is little hope of speedy improvement, because the putwaree being not unfrequently the only person who can read and write in a village, it is almost impossible to supersede him. The Mairs fortunately are eager for instruction, and many are attending the schools. Two or three of them even are putwarees. As knowledge spreads amongst them the evils of the present system may be expected to disappear, and the Mairs may take this duty from the bunya class.

23. I am engaged at present in revising the putwaree establishment in the Ajmere district—getting rid of the inefficient men, doubling up the smaller villages to enable me to give a fitting remuneration to those who undertake the duties, and causing them to be instructed more completely. The remuneration of few will be less henceforward than 60 Rupees a year, whilst the average will be about 100 Rupees a year. The revision of the Mhairwara putwaree establishment need not be undertaken till that of Ajmere is complete. In the meantime I have endeavoured to stop the practice of the putwarees being the bankers of the cultivators.

24. The tulaos in the Ajmere Pergunnah are being strengthened. Some of them suffered much from the heavy rains of last season. Most of them require foundations, which are being gradually introduced. In the Ramsur Pergunnah, from the badness of the sand for mixing with lime and the saline character of the water, the bunds are not in so good a state as in the rest of the

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district,—since mortar which is not hydraulic soon becomes disintegrated there.

25. Foundations were not given at first to the Ajmere tulaos by Colonel Dixon, because as I am informed it was his intention to have made only earthen bunds, deeming that they would be sufficient to resist the pressure of a small depth of water. With one or two exceptions, there are no tulaos in the Ajmere district formed by the damming up of streams. The country being an extensive dead flat, Colonel Dixon's object was to take in a large surface of this flat and merely retain the water from flowing off it. No great solidity was therefore requisite to obtain this end. The tulaos so formed were not intended to hold a greater depth of water generally than 4 or 5 feet in their deepest part, where the earth was thrown outwardly to form the bund. Even with this small depth, the superficial area of water is very great, from the flatness of the country, whilst the extent of the bunds is proportionately long, some being nearly 2 miles in length.

26. When the tulaos were made, it was found that from the nature of the soil it had no retentive powers whatever. It seemingly dissolved like sugar—if I may use such a simile—with the pressure of water. It was therefore necessary to face the earthen bunds with masonry, not so much for the purpose of resisting the water as of supporting the earth. Therefore thin walls, strengthened here and there with bastions, were built in front of the earthwork—the bottom, without foundation, resting on the level of the ground. The great length of the works made even the slightest wall expensive, and any considerable outlay could not be afforded for any single work.

27. Colonel Dixon had made his name famous as a constructor of embankments in Mhairwara, where the bunds are shorter, their extremities resting on rock, and at a small outlay upholding large bodies of water and

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returning a large revenue. As he received only in the first year Rupees 50,000 for the whole of Ajmere, it was necessary to husband his resources. Had he spent the money in a few tulaos only, and built them more substantially, the experiment of increase to the revenue by tank embankments would have been a failure, and further supplies might have been denied him. He therefore expended the money to bring the quickest return to the revenue. He judged rightly, and succeeded. In after works, when he was more trusted, he built more noble and substantial works, rivalling those in Mhairwara; but as his duties were much heavier than previously, he could not give them always the advantage of his personal superintendence, and had frequently to rely upon dishonest, under-paid, and hungry native officials. This is the history of the construction of the Ramsur tulaos, which being near the station of Nusseerabad are visited by the officers of that station for the purposes of sport, and are not unfrequently unfavourably criticised, in ignorance of the circumstances of their construction.

28. After the front wall without foundation had been built to support the earth, a waste-weir was added; and subsequently, as the rain acting on the earthen bund in rear of the wall dissolved it, a rear wall became necessary, thus retaining the earth of the bund between two walls. To prevent the action of the waves acting on the bottom of the front wall and percolating below it, by which many of the tulaos are emptied before their contents can be brought into use for irrigation, a foundation or plinth had to be added. It is these foundations which are now in course of construction.

29. This is the present state of all the tulaos in the Ajmere Pergunnahs. Some are further advanced in consolidation than others, and the work has been continued by me in all of them. I have been more particular, too, in the making of the mortar, having adopted the plan pursued in

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Meywar, where sand is altogether rejected as an ingredient of mortar, in the construction of all masonry bunds exposed to the action of water, and pounded brick alone is used. In Mhairwara the lime is made from limestone, and the sand being sharp, silicious sand, the mortar there, made of lime and sand, is excellent and hard; but this is not the case in Ramsur or the Ajmere district generally. With the view of ensuring good work, I have allowed the tuhseeldars to exceed somewhat the strict limits laid down by Colonel Dixon for their expenditure, which was 1 Rupee per cubic yard for masonry. The more substantial work will come to about 1-2 per cubic yard.

30. In the Rajghur Pergunnah there are some very beautiful tulaos. One especially deserves mention as being Colonel Dixon's last built bund and his best. It is not mentioned in his work on Mhairwara, as it has been made since that book was published. Colonel Dixon was particularly anxious to have shown this tulao to the late Lieutenant-Governor, the Hon'ble Mr. Colvin, had he visited Ajmere. It is at the village of Neearah, and the bund is a very beautiful, massive, and substantial piece of masonry, thrown across the Dhye river, a tributary of the Bunas and a considerable stream at this spot. The lake formed is a noble and deep sheet of water, covering 600 acres, and the land irrigated in its rear extends for a distance of two square miles in one luxuriant sheet of the richest cultivation. By its percolation, the water in the river is maintained at a high level in the channel below, enabling numerous other villages belonging to istumrar Thakoors to reap the fruits of a more bountiful supply of the precious element than they ever before received. Excluding those works constructed by the sovereigns of Meywar at prodigal outlays, this bund and lake may rank with the best works in India, and they will remain for ages lasting monuments of the beneficence of Government and the benevolence of their constructor.

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31. When Colonel Dixon was first appointed Superintendent of Mhairwara he succeeded Colonel Hall, who had made a beginning in constructing tulaos. The principal bund built by Colonel Hall was that of Gohana, of rough, uncemented stone, plastered over. One year, by the bursting of this bund, the lines of the Mhairwara Battalion at Nya Nuggur, about 6 miles lower down the stream, were washed away. There are now 6 tulaos on the same stream above Gohana, so that the force of the floods is much diminished; but the danger of a deficiency in the supply for the large tanks in seasons of scarcity is much increased. Every stream is bunded in the same way, the tulaos becoming lakes as the streams approach Beawur, not far from which they debouch into the sandy plains of Marwar.

32. To one who knows the impenetrability of a dense jungle, even to the sight, and the difficulty of persuading wild races to take to agriculture and to change entirely their habits and mode of life, I think the contemplation of an officer pitching his tent in the midst of a wild jungle, declaring to his attendants that he would make that valley's name Meywar, and at once within a few days marking off in the thick forest the positions of no less than 45 bunds and weirs, some of them of large dimensions, which he considered would accomplish the object intended, certain that population would flow to the spot, is worthy of the highest admiration: and this is what Colonel Dixon did, without anyone by to cheer or encourage him.

33. That portion of the country is now one mass of the richest cultivation. Often in the evening did the Mairs show me gorges where they considered new tulaos might be constructed with advantage; but with the exception of two spots (one where there is already a small dam, and one where a land dispute prevented the construction of a lake), I did not see in that neighbourhood a single place where an extra tulao would have been of the slightest benefit; nor was there a single work constructed that did

not accomplish some highly useful end. So strong is the desire for these works amongst the population, that many have undertaken the construction of large bunds unaided by Government, thus exhibiting a most useful public spirit and a self-reliance on their own exertions which does honor to this wild but interesting community.

34. Colonel Dixon had early constructed, in the more level parts of Mhairwara, between Nya Nuggur and Ajmere, several bunds, built in the same way as adopted by Colonel Hall, viz., with uncemented stones faced with plaster. He saw afterwards the instability and unsatisfactory nature of this kind of work, and was engaged in replacing all such defective constructions. His plans will be continued as circumstances and funds permit, such works being a constant source of outlay.

35. There are in addition to the bunds a great number of weirs. Many of these are fast silting up, as are also some of the tulaos. This is likely to become a cause of serious alarm for the well-being of the villages dependent on them. In some weirs the deposit has reached half way up the work, and in two the weir is completely filled up. As a remedy for this, it will be necessary to construct sluices level with the floor of the natural bed of the river. To remedy the danger there is of this being ineffectual, as in the Cauvery and Kistnah anicuts, these sluices will have a breadth of one-third the ordinary width of the river bed.

36. To try the working of this plan, I have constructed one in a weir which has become silted up and is now useless. At Nya Nuggur itself three sluices, each 8 feet long, have been cut out six inches above the level of the old bed of the river, which is about 60 feet broad at this spot. Large slabs of stone also have been prepared, with which at the end of the rainy season these sluices are to be closed, to raise the water to the required level. The first falls always bring down large quantities of deposit, whilst during the latter the water is clear. It will

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of course take a few years before the deposit already formed can be carried off, but I trust it will prevent its re-forming.

37. In concluding this subject, I would beg to give a list of the tanks in each Pergunnah which received repair last year, together with the amount of the grant from our tulao funds and the collections from the villages.

Pergunnahs.	No. of Tanks requiring repair.	Grant from Tulao Fund.			From Zemindars.			Total.		
Ajmere, ...	7	739	13	4	256	6	4	996	3	8
Rajgurh, ...	6	1,479	0	11	949	0	0	2,428	0	11
Ramsur, ...	24	1,213	9	3	972	0	6	2,185	9	9
Beaur, ...	33	3,316	0	8	587	6	0	3,903	6	8
Saroth, ...	7	754	12	0	754	12	0	1,509	8	0
Todgurh, ...	23	1,024	3	6	1,024	3	6	2,048	7	9
Total, Co.'s Rs. ...		8,527	7	8	4,543	12	4	13,071	4	0

38. Regarding new works, I cannot refrain from recommending the construction of one which had engaged the late Commissioner's attention during his last tour, and which he would doubtless have recommended to Government this year had he been alive. It is the construction of a bund and channel to supply the Ramsur Tulao in much the same manner as the Ajeepal bund supplies the Ana Sagor Lake. The bund of the Ramsur Tulao is an ancient work and when full there is a spread of water of 1,200 acres in the lake, but unfortunately it very rarely fills, and other tanks along the line of its sources of supply intercept the water which formerly used to flow into it. Colonel Dixon had proposed to carry the surplus water from the waste weir of the Durathoo Tulao into that at Ramsur (as mentioned in his work on Mhairwara); but as the Durathoo weir only flowed for the first time last year, this expedient of course was of no avail. His last plan was to throw a

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bund across a large nullah and bring its waters from a distance of 3 miles into the Ramsur Tulao. One rather heavy cutting is requisite, but the work is quite feasible. The only objection to the construction is the expense, which will be about 15,000 Rupees. To this however the Ramsur villagers would contribute by their labour about one-third, especially if the work were spread over two or three years, which it most probably would be.

39. The villagers are very anxious to have the bund and channel made, and, as one man expressed it, "then they would be rajahs." The cultivation in rear of the Ramsur Tulao is very extensive, and below it are three or four other tulaos, all dependent for water on the waste-weir of Ramsur. Excepting in very favorable seasons, all these, as well as Ramsur, remain empty, and in such a case this noble sheet of cultivation is a barren waste, instead of being the means of preserving the inhabitants in plenty and content. It is of the first importance to place all this tract permanently beyond the reach of capricious seasons, and I think it would be well worth the while of Government to construct the work, as it would make so much revenue sure. The repair and consolidation of the tulaos in this pergunnah will absorb all the tulao funds for years to come, and even after that there will not be sufficient at any one time for the execution of so extensive a work.

40. During the last year the high road from Nusseerabad to Deesa, between Nya Nugger and the plains of Marwar at Bur, which winds along a pass through the Arabullee hills, has been much improved and widened. Government has sanctioned 600 Rupees a year for the repair of this road; but during the rains, at a few places where it crosses the torrent along the course of which it winds, it is very miry and requires bridging. This would make it a passable road at all seasons of the year.

41. The sum allowed for the Pakureea Ghât has not yet been expended, in consequence of the disturbed state of the

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country, but after the coming Moonsoon a beginning will be made. It was thought better to delay the work than to do it hurriedly and without care.

42. A good road from Ajmere to Nya Nuggur is a great desideratum, as the country is next to impassable in the rains. I purpose continuing to build bridges along this line, in continuation of what had been commenced by Colonel Dixon. When these are all completed, I would recommend about 5 miles of the road being made every year, from the small road funds at our disposal.

43. Not much progress has been made during the past year in digging fresh wells. A very large number had been commenced previously in Mhairwara, by the advice and exertion of the late Commissioner. I have urged on their completion, but the disturbed state of the country having put the people off the work, it is difficult to get them to take to it again. If those which are already in hand can be finished a great point will be gained. Throughout Mhairwara it is generally difficult, from the rock being so near the surface, to dig wells; but fortunately the great number of tulaos has so raised the general water-level of the district that even on arid high spots a few feet generally suffices to bring to light a copious supply. As the natives expressively (though not very elegantly perhaps) say of the country,—"Its belly is filled, and only requires tapping."

44. Every encouragement ought to be given to the digging of wells, as they are the true preservatives of the inhabitants against famine. At present, well land, by the settlement, pays a higher revenue rate than tulabee or that irrigated from tulaos. This was in consequence of its greater certainty, but the greater expense of this mode of cultivation does not appear to have been kept in mind, whilst the effect of the higher tax is to throw all the well land into tulabee, and to act as a direct discouragement to the digging or employing wells in agriculture,—a result

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which is not at all compensated by any increase of revenue.

45.—The tuccavee advances outstanding are still large. Many of these were granted in Mhairwara very many years ago to wild cultivators, who never supposed that after the lapse of years they would have been called upon to repay them. Their collection is difficult and in many cases impossible. The urgent demand for re-payment from those already highly taxed only imposes a fresh burden, which weighs down their energies. In the approaching cold weather I propose to enquire regarding each separate item, to make some settled scheme for the recovery of such as can be recovered, and to bring to the notice of Government all that are irrecoverable, with the view of their being written off as such. I would request in the meantime sanction for the remission of Rupees 1,069-6-6 on account of the undermentioned villages of the Ramsur district, which were excused by you during the time you took charge of this office after Colonel Dixon's death.

Name of Villages.	Amount of remission.			Remarks.
Unnudpoora, ...	470	8	0	Not recoverable.
Umrutpoora, ...	130	0	0	Ditto ditto.
Roopa Reil, ...	84	0	0	Ditto ditto.
Purtapoora, ...	74	0	0	Ditto ditto.
Rambaree, hamlet of Ramsur, ...	165	1	6	Ditto ditto.
Nepolee, ...	145	13	0	Ditto ditto.
Total amount of remission, ...	1,069	6	6	

These items are all totally irrecoverable, and as the Ramsur district is in proportion to its capabilities assessed at a higher rate than any other pergunnah, the demand for repayment could not be met.

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46.—In consequence of the excessive rains and the failure of the Indian-corn crop in Mhairwara, and of the Bajree and Jowar in Ajmere, which require light rains and thorough drainage, the cultivators were unable to meet the cold weather kists. The failure in the crops was so complete that you deemed it advisable to postpone, by your orders dated 18th November, 1857, a portion of the kists, in the hope that the deficiency might be made good in the Rubbee harvest.

47.—With a few exceptions this has been effected, but where the cultivators have not much tulao land and the kurreef is the principal crop it will be necessary to give them a remission. Some few of the balances of last year have been partially recovered in this. In those cases in which such balances are irrecoverable they have been included in the remissions which are requested for this year. By some mistake, one or two of the tehseeldars returned to the Revenue accounts the balances of last year, as recovered in the kurreef, reckoning the amount as a fresh balance of this year, This faulty method of calculation I have checked, but it makes the balances of the year appear larger than they are in reality.

48.—Remissions are also required on account of the land submerged by the water in the tulaos, and which are assessed at high rates. Though the tulaos in bad seasons prevent a total failure of the crops and save the population from the miseries of famine, yet in seasons in which there has been more than the usual fall of rain they are so filled that their beds do not appear at all above the surface of the water, or else appear too late to enable the owners of the land to cultivate them.

49.—In some cases the land in the bed of a tulao may be owned by cultivators who possess fields in rear of the bunds, where the extra produce partly compensates for the loss. In other cases, however, one village may hold the land in rear of the tulao, whilst another may own none but what is in front, and which he may never have a

chance of cultivating for two or three years together. A poor man, to meet the assessment, is obliged to borrow money without a chance of reaping a crop with which to repay it. Interest accumulates, bills are renewed on ruinous terms, and eventually he is after a few years entirely ruined. Decrees are issued against him, and he obtains a precarious support by working as a day-labourer or selling grass and wood. The very man who is pulling the punkha over my head as I write this has land in the Ajmere Lake submerged for the last eight years, for which he has to pay 22 Rupees a year to Government. Generally speaking the beds of tulaos are lightly assessed. This scarcely alters the result, as it supposes the ryot a man of capital and provident, able to meet the demand and support himself without getting into debt—both of which qualities are foreign to the class.

50.—I would therefore beg to bring the subject to the notice of Government, and as a remedy would request the favor of your soliciting Government that I may be permitted, on the petition of a village, to strike off the settlement all such lands as are liable to constant submersion, as well as those destroyed by salt, and which will not now produce a crop. I would recommend that such should be assessed whenever they are cultivated at full rates, under the regulations which apply to alluvion and dereliction, and under which they ought fairly to be classed. This would be a great relief to the people, would be regarded as a measure of justice, and prevent many villages from throwing up their leases.

51.—It will be observed that a few villages, from various causes, have already applied to be made kham. In all such cases the villagers have preferred the application with great reluctance, and only after they have been heavy sufferers. No applications have been listened to excepting when the inhabitants have been much reduced, and my remarks on all such cases will show the nature of the

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sufferings that have led to the request. Some in a few years may be able to revert to the settlement, but most will not be able to do so, whilst several other villages are anxious to be made kham besides those now alluded to.

52.—When the settlement was originally made, it will be remembered that the villagers accepted it with great reluctance. Colonel Dixon, in his settlement report, dated 28th February, 1850, Para. 14, says,—"Our labours to "convince the people that their welfare and benefit had "been mainly studied in the proposed arrangement were "unheeded. From their own statements the villages were "so indifferent as to be scarcely worth acceptance as a "gift. As all the putails and head men were of one mind, "it is evident they had been instructed by some evil-dis-"posed people who loiter in the vicinity of our Courts "to reject our offers. The dissentients were allowed one "week for consideration and for communication with their "families, at the expiration of which, in the event of dis-"sent, the regulations bearing upon the present questions "(para. 138 of the Circular Orders by the Sudder Board "of Revenue) would be put in force."

53.—The Hon'ble the Lieutenant-Governor, the late Mr. Thomason, was under the apprehension, "since the sum "demandable under the settlement exceeded the collec-"tions during any one year of kham management, and has "only been once reached since the territory came under "British management, that the assessment might be found "in some degree higher than the country could bear;" and in the same letter from the Secretary to Government, N.-W. P., dated 25th April, 1850, decided that "it was to be "understood that, except after report to Government and "special sanction, no other penalty is to attach to non-ful-"filment of the settlement contract than annulment of the "lease and return to kham management." The assess-ment, as expected, has pressed rather heavily, especially when we take into consideration that the soil in many

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places is of the poorest, while the rate for irrigated land is particularly high. The average per acre as fixed by the settlement is as follows :—

Name of Districts.	Irrigated land : acres.	Average Rate per acre on Irrigated land.	Average Rate on cultivation.
Ajmere, ...	24,351	4 12 0	2 1 3
Ajmere, Mhairwara, ...	13,026	4 4 0	2 7 6
Marwar, Mhairwara, ...	1,142	5 2 0	2 15 2
Meywar, Mhairwara, ...	8,255	7 8 0	5 0 11

54.—The principal irrigated crops being wheat and barley, the price of these grains in the market is an important consideration when calculating the means of the ryots to pay a money assessment. Within the last few years they have fallen so much that what might have been a moderate money assessment at the time of the settlement has now become the reverse. I have had prepared a list of prices of the principal grains in the marts of Ajmere and Nya Nuggur for a term of years, from which it appears that the prices of wheat and barley have fallen 50 per cent. below what they were for the 3 years preceding the settlement.

	Average price per Rupee during 3 years previous to settlement, from 1847 to 1850.		Average price per Rupee of last 3 years from 1855 to 1858.		Fall per cent.
	Maunds.	Seers.	Maunds.	Seers.	
Wheat, ...	0	$18\frac{12}{16}$	0	$26\frac{3}{16}$	40
Barley, ...	0	$26\frac{8}{16}$	1	$2\frac{8}{16}$	$60\frac{1}{2}$
Grain, ...	0	$24\frac{3}{16}$	1	$0\frac{14}{16}$	$66\frac{2}{3}$
Jowar, ...	0	$20\frac{7}{16}$	1	$2\frac{16}{16}$	109
Indian Corn, ...	0	$26\frac{11}{16}$	1	$4\frac{8}{16}$	$66\frac{2}{3}$
Bajree, ...	0	$20\frac{15}{16}$	0	$35\frac{3}{16}$	26

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[The remainder of the Report refers to local subjects, not of any general interest.]

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From WILLIAM MUIR, ESQ., *Secretary to Government of the North-Western Provinces, to* GENERAL G. LT. P. LAWRENCE, *Offg. Commissioner, Ajmere, Revenue Department, No. 1535 of 1858.—Dated Allahabad, the 9th October, 1858.*

SIR,—The Right Hon'ble the Governor-General has had under consideration your letter No. 32, dated the 2nd August, with the report made by Captain Brooke, the Officiating Deputy Commissioner, upon Ajmere and Mhairwara, after his annual tour through those districts during the past year. I am instructed, in reply, to communicate the following remarks and orders.

2.—His Lordship has noticed with satisfaction the testimony borne by Captain Brooke in his 5th para. to the improved and comfortable appearance of the people in the vicinity of the embanked lakes.

3.—The remarks in para. 16 upon the evils to which the Civil Courts are liable among the rude and simple population of Mhairwara are important. The action of these Courts must be carefully watched—especially the punchayuts, which are said to be used sometimes as an engine of oppression. The subject should be referred to in future annual reports.

4.—Captain Brooke is rightly turning his attention to the accuracy of the village papers. It should be his endeavour to make them contain the record of all annual changes of occupancy and proprietorship, so that they may correctly exhibit the state of each village, which it appears they do not at present. An improvement in the qualifications of the putwarees may be looked for from the more adequate salaries which Captain Brooke has now provided for the office.

5.—The tendency shown by the lakes to silt up to the level of the weirs must be counteracted by every suitable precaution. The opening of sluices level with the bed of the river, in order to scour off the deposits, will it is hoped

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prove successful. The Deputy Commissioner will hereafter report upon the result of this experiment.

6.—Before coming to any decision on the proposal for the new work to feed the Ramsur Lake, His Lordship concurs with you that further information is required. A special report should accordingly be submitted, indicating the extent of increased cultivation to be looked for,—the benefit to the Government Revenue,—the exact cost of the work by careful estimate,—the risk of failure in complete success. On receiving these details, the Governor-General will be prepared to issue further orders on the subject.

Paras. 38 and 39.

7.—His Lordship sanctions the proposal supported in your 9th para., for bridging and completing the road from Ajmere to Nya Nugger. It is understood that the charge will fall upon the existing Road Funds.

Para. 42.

8.—If, as surmised by Captain Brooke, the village rates for land watered from wells are too high in comparison with that irrigated from lakes, it may be worth consideration whether the terms of internal village settlement might not be advantageously revised in this respect.

Para. 44.

9.—The Governor-General has been pleased to remit the sum of Rs. 1,069-6-6, being amount of irrecoverable advances made for the construction of wells.

10.—The subject discussed by the Deputy Commissioner in his 48th, 49th, and 50th paras. is one closely affecting the prosperity of all estates adjacent to the irrigation lakes. The expanse of water has frequently submerged tracts of productive land, or injured it by inducing a saline deposit or efflorescence. Captain Brooke seeks for permission "to strike off the settlement all such lands as are liable to constant submersion, as well as those destroyed by salt." But this would not be in accordance with the principles of the village settlement made by Colonel Dixon. The settlement

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is by the village, and not by the field or ryot. It would not therefore be proper to strike off the assessment of particular fields which chance to become unproductive ; nor would the " alluvion and diluvion" rules, as proposed by the Deputy Commissioner, answer—the principle on which they are framed is applicable solely to lands affected by rivers.

11.—In laying down the procedure which should guide the district officer on this subject, it must be remembered that most villages of which portions have become unproductive from submersion or deterioration of soil have otherwise benefited by the lakes ; and that, putting the gains against the losses, the balance is greatly in favour of the proprietors. The matter therefore becomes one of profit and loss amongst the proprietors, who must adjust the account themselves. Should they be unable to do so, it is a species of dispute which the Revenue Authorities are well competent to decide for them. The Deputy Commissioner should be careful that no sharer continues unduly to suffer, as it is apprehended that some now suffer, by remaining liable for the original assessment of lands no longer productive. A readjustment of the conditions of settlement and reconstruction of the settlement record of rights and liabilities may in cases of this kind become necessary, and the district officers must not shrink from making it. But any measure of direct individual relief which would tend to weaken the joint responsibility of the village must be avoided.

12.—On the other hand, there may be exceptional cases in which a village is injured without being proportionately benefited,—the advantages of irrigation from the lake being enjoyed by other estates. In this case, if the assets of a village have been seriously diminished,—so that the Government demand has become disproportionately heavy,—a summary re-settlement should be made on the existing average assets. The deputy commissioner is responsible for readjusting the demand in every such case before the estate has become disabled by over-assessment.

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13.—In all proposals for new embankments and lakes the possible loss of assets from these causes should be borne in mind and calculated as a set-off against the advantages to the tracts which will directly profit by the new irrigation.

14.—The remarks of Captain Brooke in paras. 52 to 54, on the pressure of the assessment generally, show the urgent necessity of carefully watching and promptly remedying any injuries of the kind under consideration.

* * * * * * * * * *

In conclusion, I am desired to state that Captain Brooke's report is very creditable to him, and that His Lordship has perused it with much interest. It will be published in an early number of the "*Selections.*"

I have, &c.,

W. MUIR,

Secretary to the Government, N.-W. P.

Allahabad, the 9th October, 1858.

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No. 17.

FLAX CULTIVATION IN THE NORTH-WESTERN PROVINCES.

No. I.—*From* DR. WILLIAM JAMESON, *Superintendent, Botanical Gardens, to* J. D. SANDFORD, ESQ., *Officiating Under-Secretary to Government, North-Western Provinces, Allahabad (No. 93).—Dated Seharunpore, the 15th February, 1861.*

BEFORE replying to your letter No. 1472A., dated 22nd October last, with enclosures, I deemed it necessary to examine what had been done regarding the cultivation of flax in India, and particularly in the Punjaub, preparatory to submitting a full and detailed report. To do this I found, however, would be only going over a subject which had been fully investigated and exhausted by the late Dr. Royle, in his work styled the "Fibrous Plants of India," and by Mr. Cope, "in a paper lately published in the Journal of the Agricultural and Horticultural Society of India, Part I., Vol. VI. of 1859."

2. In these publications full details will be found regarding all the experiments made on flax cultivation throughout the country.

3. In the Punjaub the subject had been taken up with energy and activity, and good results had been gained. But in my late tour I ascertained that in almost every district where the plant had been cultivated, unless that of Sealkote, it had been discontinued. The experiment therefore, so successfully begun, was too prematurely abandoned.

4. No doubt the question that good flax fibre can be raised in the Punjaub, fitted for the Home market, has been solved, and has thus passed from speculation to fact. But still, as far as the natives of the country are concerned, nothing has yet resulted. The cultivation instead of extending has diminished, and had not the De-

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puty Commissioner of Sealkote taken up the subject with energy and activity the experiment would have been fruitless; or as remarked by Mr. Cope, would have died out in the Punjaub of sheer inanition, and that too originating in three causes.

1*st.*—Want of perseverance on the part of the local Government.

2*nd.*—Want of enterprize on the part of British manufacturers.

3*rd.*—Want of activity, energy, and interest on the part of the native cultivators in the progress and welfare of the country.

5. In a country like India, Government, when desirous of introducing a new product or of rendering an old one by a process of cultivation unpractised before, valuable in the arts, must take the initiative, in order to overcome the prejudices of the ignorant, indolent, and slothful cultivators. There is no active and energetic middle class to direct and encourage the labours of the native farmer, and it is a well known fact that even in Britain there is no class more difficult to persuade to adopt new and improved processes of cultivation and new ideas regarding farming than the agriculturist; and had not the policy lately introduced opened up the country to free trade, the old and routine system of cultivating the land would have by thousands been continued to this day.

6. The British farmer is now compelled, by the free importation of grain, to resort to high and scientific cultivation and the best manures, in order to enable him to hold his own.

7. Messrs. Mechi and others, through means of their private experimental farms, have shown to their tenants and tenant farmers how to maintain their position, even though the British markets be extensively supplied with untaxed mead stuffs from abroad. In this country such spirited individuals are

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unknown, and therefore anything to be introduced for its improvement must be initiated by Government. The system at present followed by native farmers in cultivating flax for its seed is miserable in the extreme, the shore or straw from whence the fibre is obtained being either used as fuel or broken up and mixed with other substances and given to cattle. Let natives be shown that substantial advantages would accrue to them by cultivating the flax properly, and that a good marketable fibre can be obtained from it, for which there is always a ready and immense market, and I doubt not but that they would soon take to the cultivation. But though the cultivation in the Punjaub has in most places retrograded, yet still beneficial results have ensued from the experiment instituted by Government, which may be of immense importance to the country.

8. By the exertions of Mr. D. McLeod and others, the experiment was prominently brought to the notice of the flax manufacturers in Britain, where for years the supply of flax from Home cultivation and foreign importation has been far short of the demand, and samples of the fibre laid before them which were pronounced as worth £55 per ton; and so satisfied were they by the specimens exhibited that the Punjaub was fitted to grow flax suited to the Home market, that they formed a Company, "The Indian Flax Company, Limited, of the Punjaub," in order to carry it on; and their Agent, Mr. Wightman, has now settled in the Sealkote district and has commenced operations. By him advances have been made to zemindars to cultivate flax, which they will repay him back in kind. He too has distributed acclimated seeds and has applied to me for a large supply to extend his operations, which however I cannot meet. Land of his own he has none, and he is therefore entirely dependant on native cultivators. The system introduced is an admirable one, and will continue to be so as long as the Company consider

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the interests of the native cultivator as well as their own; or, in other words, give him a fair remuneration for his labor. If this be done, and if the superintendence be confined to advice in the manner of cultivating the plant properly and preparing the fibre, and the distribution of acclimated seeds, and above all—in a newly acquired country like the Punjaub, where the inhabitants look to the district officers as their best advisers—if the countenance of Government through the district officers be continued, flax cultivation will rapidly spread, and the fibre become an important article of exportation.

9. But as yet the small success gained in the Punjaub is not in my humble opinion sufficient to stimulate private enterprise to seek a field for operations in the North-West Provinces.

10. The services of Mr. Cope are not available; or if they were they could only be procured at a rate which Government would not be prepared to meet. By him extensive mercantile transactions are carried on at Umritsur, and thus his time is fully occupied; nor is he acquainted with the methods of preparing flax.

11. To grow the plant assistance is not required. This we can do. What are wanted are—

1st.—Good scutches and hecklers—men intimately acquainted with the processes of manipulation and fitted to teach the natives of the country.

2nd.—A large supply of acclimated seeds.

3rd.—The best kind of machinery used in preparing flax.

4th.—The directions for the proper management of the flax crop, compiled by the Committee of the "Royal Society for the promotion and improvement of the growth of flax in Ireland," with a few alterations and modifications to suit the climate of the North-Western Provinces, might be translated into Hindee, printed and distributed to native cultivators through district officers, with much

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advantage. I append a copy of the Society's directions, altered to suit the climate of this country, and at the same time amended from practical experience obtained by cultivating the plant for many years at Seharunpore.

12. In the work alluded to all the information required on flax cultivation is to be found; and the Agricultural and Horticultural Society of Calcutta, by publishing the most important information to be found in the reports of transactions of the Royal Society for the promotion and improvement of the growth of flax in Ireland, have done all that is required to popularize the culture, so far as that can be done by the Press, and in Doctor Royle's work on the Fibrous Plants of India the cultivator will find the same information condensed. To him therefore I would recommend this work as a text-book.

13. Prizes have already been offered by the Punjaub Government for the best samples of prepared fibre, and for the largest quantity of land brought under cultivation with flax, but with no beneficial results, as they remain unclaimed by anyone. Such an inducement held out appears to be of doubtful utility, though it might with much advantage be done on a small scale by district officers.

14. In the magnificent system of Canal Irrigation, the North-West Provinces has the means for flax cultivation far superior to that possessed by the Punjaub, and to encourage it, therefore, and meet the demands for acclimated seeds on an extensive scale, I would respectfully recommend that an experimental farm of from 50 to 60 acres be formed in the Seharunpore district, adjoining the garden, where irrigated land can be procured at a reasonable rate; that the incidental expenses, such as land-rent, water, &c., be met by the sale of the seeds—a certain quantity being reserved for district officers for distribution to zemindars. That if European instructors be available in this country, two men be obtained from the ranks of any regiment for a short time to prepare the fibre, and

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teach natives how to scutch and heckle; that the fibre be sold when prepared to meet the wages of the parties who prepare it,—a large sample being reserved for exportation and examination by British manufacturers. That acclimatized seeds be given to district officers (particularly those whose districts are in part irrigated by canals), to distribute to zemindars: and that all zemindars repay in kind, with the shore or straw, the value of the seeds received; and that small rewards, such as those distributed by the Deputy Commissioner of Sealkote, be given to such cultivators as present the best samples of flax plants for scutching. These rewards were received with the greatest satisfaction by the cultivators at Sealkote, the more so as they were distributed publicly to the recipients by their own district officers.

15. For the plants raised by zemindars and fitted for preparing fibre there might at first be difficulty in procuring a market; but the finest samples might with advantage be purchased by Government, and from them fibre prepared for the market, as an encouragement to the best cultivators. This of course could only be done to a limited extent; but when the field became extensive it would be high time for Government to discontinue the experiment and hand it over to private capitalists.

16. But the seed alone would ensure the zemindars from any loss. In fact he would only be doing, though with better seeds, what he is now doing,—flax of inferior quality and quite unfitted for preparing fibre being cultivated everywhere.

16½. In the Punjaub, both Mr. Wightman and Mr. Cope are prepared to purchase all fibre of good quality; and were it shown that flax capable of producing good fibre could be grown in the North-West Provinces, capital and funds to work it would no doubt be forthcoming to take it up.

17. To do this it would be necessary to import some good seed from Livonia or Kurland, from which all the best Dutch seeds are procured. To the acre about two, bushels

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or 1¼ maunds, are required; I would therefore recommend that a ton, or 28 maunds, be imported, which with the acclimated seed that will be available this season would enable me to cultivate 50 acres of land,—an ample extent to spread the seed over the country.

18. When the Hon'ble the Lieutenant-Governor visited the Garden last season he saw two fields under cultivation with flax, the one with Russian seeds, the other with indigenous seed, and the plants of the former were from 3½ to 4½ feet; the latter only 2 to 2½ feet.

19. From the former seed a supply was sent to Mr. Cope, then Secretary to the Agri-Horticultural Society of the Punjaub, and from it dates the commencement of the experiment of flax cultivation in the Punjaub.

20. Into the Punjaub flax seed was imported in quantity, but owing to it having been badly packed it failed to germinate. The Hon'ble the Lieutenant-Governor having granted me leave to proceed to England for a few months, during my sojourn there I would gladly make arrangements to procure the machinery used in preparing flax, and the best kind of seed, and at the same time ensure it being well packed. I too intend to visit the flax districts in Ireland, and the linen factories in England and Scotland, in order to examine the machinery there employed. If therefore I can usefully employ my time in procuring such implements and machinery as are necessary for the purpose, being well aware of the requirements of the North-West Provinces, I shall have much satisfaction in doing so.

W. JAMESON,
Superintendent, Botanical Gardens,
North-Western Provinces.

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APPENDIX.

Directions for the proper management of the flax Crop, compiled by the Committee of the Royal Society for the promotion and improvement of the growth of flax in Ireland.

Soil and Rotation.—By attention and careful cultivation, good flax may be grown on various soils; but some are much better adapted to it than others. The best is a sound, dry, deep loam, with a clay subsoil. It is very desirable that the land should be properly drained and subsoiled; as when it is saturated with either underground or surface water good flax cannot be expected.

It is not considered generally advisable to grow flax more frequently than once in ten years,—not because it exhausts the land more than other crops, but because good flax cannot be had at short intervals on the same soil. In Belgium it invariably follows a corn crop, and in this country it can with much advantage follow wheat, the ground being allowed to be fallow during the rains.

Preparation of the Soil.—One of the points of the greatest importance in the culture of flax is, by thorough draining and by careful and repeated cleansing of the land from weeds, to place it in the finest, deepest, and cleanest state. This will allow the roots to penetrate, which they will often do to a depth equal to one-half of the length of the stem above ground.

One ploughing will be sufficient on light friable loam, but two are better, and in stiff soils three or four are advisable. Thus, one before the rains set in, two during the rains, and one in October, or before sowing, to destroy all weeds, and thus save a great deal of trouble in after-weeding. After ploughing, pass the *mairah* over the ground, so as to break all clods of earth and make the land smooth.

Sowing and the best kinds of seeds.—The seeds best adapted for sowing are acclimated Russian seeds, and in selecting them care should be taken that they are plump, shining, and heavy. They ought before sowing to be sifted, and all the seeds of weeds carefully separated from them. In sowing, sow from ten to twelve seers to the kutcha beegah. It is better to sow too thick than too thin, as with thick sowing the stems grow tall and straight, and the fibre is found greatly superior in fineness and length to that produced from thin sown flax, which grows coarse and branches out, producing much seed, but an inferior quality of fibre. The ground being well pulverized and well cleaned and smoothed by the *mairah*, let it be sown either in drills or broad cast.

Manure for the flax crop.—As the flax requires good strong land, it ought to be well manured before the seeds are sown; viz. from 40 to 50 cart-loads per acre.

Weeding.—This can be done by women and children, and by them care ought to be taken to weed in the direction (*viz.*, south-east to north-west)

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contrary to the prevailing winds, in order that the plants trampled down by the weeders may be blown up again, or thus be assisted in gaining their upright position. The tender plant, pressed one way, soon recovers, but if twisted or flattened by careless weeders it seldom rises again, and is thus liable to be destroyed. Two weedings are generally ample, but this depends much on the state of the land where the flax is sown, and the cleanness of the seeds.

Pulling.—The time when flax should be pulled is a point of much nicety to determine. The fibre is in the best state before the seed is quite ripe. If pulled too soon, although the fibre is fine, the great waste in scutching and heckling renders it unprofitable; and if pulled too late the additional weight does not compensate for the coarseness of the fibre. It may be staed that the best time for pulling is when the seeds are beginning to change from a green to a pale brown colour, and the stalk to become yellow for about two-thirds of its height from the ground. When any of the crop has been lying and suffering from wet, it should be pulled as soon as possible and kept by itself; if the flax plants be of different lengths, each length ought to be collected separately and steeped separately. When there is much second growth, the flax should be caught by the puller just under the bolls, which will leave the short stalks behind; and if the latter be few it is best not to pull them at all, as the loss from mixture and discoloration by weeds would counterbalance the profit. It is highly essential to take time and care to keep the flax even, like a brush, at the root ends. This increases the value to the spinner, and of course to the grower, who will be amply repaid by an additional price for his extra trouble. Let the handfuls of pulled flax be laid across each other diagonally to be ready for the

Rippling,—which should be carried on at the same time and in the same field with the pulling. The ripple consists of a row of iron teeth screwed into a block of wood, and can be made by any handy blacksmith. It is to be taken to the field where the flax is being pulled, and screwed down to the centre of a nine-feet plank resting on two stools. The ripplers may either stand or sit outside at opposite ends. They should be at such a distance from the comb as to permit their striking it properly and alternately. A winnowing sheet must be placed under them to receive the bolls as they are rippled off; and then the ripplers are ready to receive the flax just pulled, the handfuls being placed diagonally and bound up in a sheaf; the sheaf is laid down at the right hand of the rippler and untied. He takes a handful with one hand, about six inches from the root, and little nearer the top with the other; he spreads the top of the handful like a fan, draws the one-half of it through the comb, and the other half just the side; and by a half turn of the wrist, the same operation is repeated with the rest of the bunch. Some however prefer rippling without turning the hand, giving the flax one or two pulls through

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the comb, according to the quantity of bolls. He then lays the handfuls down at his left side, each handful crossing the other, when the sheaf should be carefully tied up and removed. The object of crossing the handfuls so carefully after rippling, when tying up the bundles for the steep is in order that they may part freely from each other when they are taken to spread out on the grass and not interlock and be put out of their even order, as would otherwise be the case. If the weather be dry the balls should be kept in the field spread on mats, and turned from time to time. If the weather be rainy they should be taken indoors, and spread out thinly on mats and turned twice daily. In fine weather the bolls ought always to be dried in the open air, and the heaviest and plumpest kept for sowing. Flax ought not to be allowed to stand in the field, if possible, even the second day. It should be rippled as soon as pulled, and carried to the water as soon as possible, that it may not harden.

Watering.—This process requires great care and attention. River water is the best. If spring water be used, let the pool, which ought to be from 12 to 18 feet in length, and 3½ to 4 feet deep, be filled, and the water remain a short time before using it. Place the flax loosely in the pool in one layer, somewhat sloped and in regular rows, with the root end underneath, the tie of each row of sheaves to reach the roots of the previous one. Place stones so as to sink the flax a little in the pond, and as fermentation proceeds increase the weight to prevent it rising; a small stream of water allowed to run through the pool has been found to improve its color. In this case, if the pools are in a line, the stream should be conducted along the one side, and thus run into each pool separately, and the water run off on the opposite side in a similar manner. It will be sufficiently steeped in from 36 to 48 hours, but this will depend entirely on the heat of the weahter and the nature of the water. Every grower should learn to know when the flax has had enough of the water, as a few hours too much may injure it. The best test is the following:—

Try some stalks of average thickness, by breaking the shove or woody part in two places about six or eight inches apart at the middle of the stalk; catch the broken bit of wood, and if it will pull freely out downwards for that length without breaking or tearing the fibre and with none of the fibre adhering to it it is ready to take out. Make this trial every two or three hours after fermentation subsides, for sometimes the change is rapid. It is advantageous to let the flax drain for four or five hours after being taken from the pool, by placing the bundles on their root ends close together; but the heaps ought not to be too large, otherwise the flax is liable to be injured by heating.

Spreading.—Select where possible clean, short grass land for this operation, removing any weeds that rise above the surface of the sward. Lay the flax evenly on the grass, and spread thin and equally. Turn it two or three times while on the grass with a rod 8 feet in length and 1½

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inches in diameter, that it may not become of different shades by the unequal action of the sun, which is often the case when this is neglected.

Lifting.—If the weather is dry eight to ten days, and if showery four to six days, will be ample on the grass. A good test of its being ready to lift is to rub a few stalks from the top to the bottom, and when the wood breaks easily and separates from the fibre, leaving it sound, it has had enough of the grass. Also when a large proportion of the stalks are perceived to form a bow and string from the fibre contracting and separating from the woody stalk. But the most certain way is to prove a small quantity with the hand-break or in a flax mill. In lifting, keep the lengths straight and the ends even, otherwise great loss will occur in the rippling and scutching. Let it be set up for a few hours, and afterwards tie it up in small bundles; and if not taken soon to be scutched, it will be much improved by being put up in small stacks loosely built with birches and branches of trees at the bottom to keep it dry, and allow a free circulation of air.

Drying.—Exposure to the sun is sufficient for all purposes.

Breaking and Scutching. This is either done by the hands or by mills, the latter being much the best. For India, therefore, it would be necessary to import them.

The above is a condensed view of the directions for preparing flax issued by the Royal Flax Society. Of course, without the improved machinery now used, it would be impossible to prepare flax of first-rate quality.

Botanical Garden, Seharunpore, February 19, 1861.

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No. 18.

MEMORANDUM REGARDING WEIGHTS AND MEASURES IN THE DISTRICT OF CAWNPORE.

By R. MONTGOMERY, ESQ., *Collector and Magistrate of Cawnpore.*

Regulation VII. of 1833 had in view amongst other objects that of fixing "the weight of the Furruckabad Rupee "as the unit of a general system of weights for Government transactions throughout India under the native "and well-known denomination of the Tola."* Since then it has been the weight used in Government transactions. It was apparently not the intention of the Legislature to fix this as a standard weight for all mercantile transactions. It was left to traders and others to fix their own standard, according as habit or interest led them to prefer. It is well known that the greatest irregularity prevails throughout the North-Western Provinces with regard to weights, and not only do they vary in districts, but in villages in the same district. There can be no doubt that this is a hindrance to business, and that it tends to create confusion and affords opportunity for fraudulent transactions. Some serious cases of fraud were brought to my notice shortly after joining this district, owing to the diversity of weights. I was aware that I could not introduce any general standard of weights contrary to the wishes of the people, and I therefore summoned the heads of the different trades in the city to a

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* PREAMBLE REGULATION VII. OF 1833.

Latter part of Section IV.

"The Tola or Sicca Weight to be equal to 180 grains Troy, and the other denominations of Weight to be derived from this unit, according to the following scale :—

8 Ruttees=1 Masha=15 grains Troy.

12 Mashas=1 Tola=180 ditto.

80 Tolas (or Sicca Weight), 1 Seer=2¼ lbs. Troy.

0 Seers=1 Mun, or Bazar Maund=100 lbs. Troy."

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conference, and suggested to them the propriety of their fixing a standard weight for all their transactions. I intimated that the Government weight of 80 tolas would perhaps be the most convenient. After much discussion they agreed to assimilate all their weights to that of the Government standard of 80 tolas; but they urged the necessity of having a similar standard in the cantonments, without which the adoption of any change would be useless.

This appeared reasonable, and I entered into a correspondence with Major Nuthall, the Commissariat Officer, and Captain Harris, the Cantonment Joint Magistrate, on the subject. They both agreed with me as to the propriety of introducing uniform weights; and the former officer pointed out* that the 80 tola weight was the only one allowed to be used in cantonments.

After allowing a certain period to elapse for the purpose of preparing weights, a day was fixed for the adoption of the new weights both in the city and cantonments. Several thousand weights were made up in the Cawnpore Magazine, with the aid of Captain Reid; and a great many were manufactured in the city.

After the lapse of a few months, I found that the Bunniahs and others dealing directly with the city were desirous of having their weights assimilated to those in use there. This seemed to be a favorable time to make the measure a general one. I therefore directed the Tehseeldars to ascertain the feelings of the people on the subject, and to explain to them the advantages of having a gene-

* "The new system of weights prescribed by Regulation VII. of 1833, "in the Financial Department, having been ordered to be observed in "all Commissariat transactions, the Governor-General of India in Council, with the view of introducing an uniformity of system, is pleased to "direct that the new standard of 80 tolas shall be adopted in all Military "bazars and cantonments from and after the 1st November next."—*G. O. G. G., No.* 184, *dated* 17*th August*, 1835.

ral standard weight. They did this most judiciously, and reported that the people were prepared to adopt the seer in use at Cawnpore. I then sent the form, *Appendix A.*, to be filled up by the different tehseeldars, directing them to make the individual who required the weights sign his name in the column left for that purpose. On the returns having all been received, I found that the tehseeldar's statements were correct, and that the people were unanimous on the subject.

It became of great importance to secure the breaking up of the old weights, as were they allowed to exist confusion would be the result. The tehseeldars, with the consent of the people, set up forges at the tehseeldarees, and received the old iron weights at a certain valuation, which was deducted from the price of the new ones. In a few months 40,206 weights were issued. In some cases the people preferred making their own weights, but they were stamped and verified by the tehseeldars. When a pergunnah was completed, the return in *Appendix B.* was required.

The 80 tola weight now generally prevails throughout the district. In certain localities, especially on the borders of other districts from whence the markets are supplied, different weights will sometimes be found; and this must be expected till such time as the Government weight becomes universal.

At the same time the cloth merchants in the city all agreed to adopt one uniform measure; and the English yard was fixed upon. No other is now in use. Several hundred yard-measures were made up, tipped with brass, and stamped. They were sold at 2 annas a-piece, and were in great demand. It became necessary to make several sets, and after being verified they were sent to the kotwalee for sale.

As soon as the new standard weights and measures were universally adopted in the city, they began to be used

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throughout the district. This will always be found to be the case. In such places as Cawnpore, Meerut, Agra, and Delhi, the sudder bazars, situated in cantonments, invariably regulate all the rest; and if the Government order on this point be only strictly carried out in the former, it will without difficulty be followed in the latter.

The tehseeldars are a most valuable agency, through whom any general measure of this kind may be successfully introduced.

Annexed is a list *(Appendix C.)* of the weights made up and distributed, with their average cost. The prices vary in the several pergunnahs. One reason for this is that in some localities (near the Jumna for instance) iron is cheaper. Another reason is that some of the tehseeldars have managed the matter more economically than others. In no place has the price been excessive.

R. MONTGOMERY,
Collector and Magistrate of Cawnpore.

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APPENDIX A.

FORM.

Name of Village.	Name of Shopman.	*No. of Weights required.* Punseree.	Seer.	½ Seer.	¼ Seer.	⅛ Seer.	Chuttack.	Total.	*No. of old Weights which will be given up.* Punseree.	Seer.	½ Seer.	¼ Seer.	⅛ Seer.	Chuttack.	Total.	Signature of the Individual requiring them.
Malon.	Hoolas Bukal.	0	1	1	1	1	1	5	Has none—borrows from his Partner.							Hoolas, Bukal.

APPENDIX B.

FORM.

Name of Village.	Name of Shopman.	*Number of Weights made up and distributed.* Punseree.	Seer.	½ Seer.	¼ Seer.	⅛ Seer.	Chuttack.	Total.	*Price of the new Weights.* Punseree.	Seer.	½ Seer.	¼ Seer.	⅛ Seer.	Chuttack.	Total.	Value of old weights.	Remaining balance due.	Date of distribution.	By whom distributed.	Signature of the person who received the weights.	Signature of the person who received the price.
Malon.	Hoolas Bukal.	0	1	1	1	1	1	5	0	As. 7 P. 1½	As. 3 P. 7	As. 1 P. 9¾	Pie. 11	Pie. 5¼	As. 13 P. 11	0	As. 13 P. 11	9th April 1848.	Mohomed Khan, Jemadar, and Muttra Pershaud, Mohurrir.	Hoolas Bukal.	Muttra Pershaud.

APPENDIX C.

Name of Pergunnahs.	Number of Shops.	Number of Weights distributed.	Average number taken by each Shop-keeper.	Average cost of Weights in each Pergunnah.																				
				Punserees.			Seers.			½ Seers.			¼ Seers.			⅛ Seers.			1 Chuttack.			Total.		
				R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.	R.	A.	P.
Bithoor, ...	1025	4,054	4·0	2	3	10	0	7	1½	0	3	7	0	1	9¾	0	0	11	0	0	5¾	†3	1	9
Derapoor, ...	377	1,174	3·1	1	9	9	0	5	2	0	2	7¼	0	1	3¾	0	0	8	0	0	4	2	3	10
Bhogneepoor, ...	692	2,821	4·0	1	8	6	0	4	10¾	0	2	5½	0	1	2¼	0	0	7¼	0	0	3¾	2	2	0
Secundrah, ...	475	1,802	3·7	1	12	5	0	5	9½	0	3	1½	0	1	4	0	0	9½	0	0	6½	2	8	0
Akberpoor, ...	666	2,633	3·9	0	*8	0	0	*1	0	0	*1	0	0	*1	0	0	0	*6	0	0	*6	0	*12	0
Jaujmow, ...	599	3,360	4·8	†2	3	10	0	7	1½	0	3	7	0	1	9¾	0	0	11	0	0	5¾	†3	1	9
Belhoor, ...	655	3,454	5·2	1	11	5	0	5	6	0	2	9	0	1	4	0	0	8	0	0	4	2	6	0
Russoolabad, ...	470	1,896	4·0	2	0	0	0	6	4¾	0	3	2¼	0	1	7½	0	0	9¾	0	0	4¾	2	12	4¾
Sarh, ...	722	3,134	4·3	1	12	1¼	0	5	7½	0	2	9¾	0	1	4	0	0	8½	0	0	4¼	2	6	11¼
Ghatumpoor, ...	861	3,275	3·8	0	*8	0	0	*1	0	0	*1	0	0	*1	0	0	0	*6	0	0	*6	0	*12	0
Sheorajpoor, ...	387	1,521	3·9	1	13	3	0	5	11	0	2	11½	0	1	6	0	0	9	0	0	4½	2	8	9
Kotwalee, ..	...	11,082	...	...			...			...			...			...			...			...		
Total number of Weights, ...	...	40,206																						

* In Ghatumpoor and Akberpoor the labour alone is entered, and not the value of the iron.

† The city and extensive suburbs are included in these Pergunnahs. The weights were generally made up in the Magazine. They were more expensive, but better executed.

R. MONTGOMERY,

Collector and Magistrate of Cawnpore.

No. 19.

EXPERIMENTS ON KUNKUR.

Memorandum of experiments on, and analysis of, specimens of Kunkur from about the 393rd mile-stone on the Grand Trunk Road, near Naubutpore, by LIEUT. C. H. DICKENS, *Artillery.—Secrole, Benares, 19th Sept., 1849.*

Two experiments were made on the hydraulic properties of the kunkur.

A., with the finer parts afterwards made into the square piece of cement.

B., with the coarser parts afterwards made into the triangular pyramid.

Both these were heated nearly to whiteness in crucibles for an hour, and then weighed; heated again for half an hour and again weighed; and after a third heating, having found no further loss of weight, the carbonic acid and water were concluded to have been completely expelled.

A. lost 31·5 per cent. ... ... *B.* lost 28·2 per cent. In slaking, both swelled much, cracked, and gave out a good deal of heat. They were each made up (without any addition or grinding) into a stiffish mortar, formed into the shape above indicated, and immediately placed under water.

Examined as follows:—

After.	*A.*	*B.*
6 hours, ...	Not examined, ...	Had set.
12 ditto, ...	Had set,	
24 ditto, ...	Not examined, ...	Hardened; but could be marked by a strong pressure with the finger nail.
2 days, ...	Could just be marked by the nail, ...	Could not be marked by the nail.
3 days, ...	Not examined, ...	Grated under knife, but was not cut, to avoid spoiling specimen.
5 ditto, ...	Surface very hard and could be chipped off, after which interior cut like chalk.	
7 ditto, ...	... ...	Removed to be sent to Major Willis.
10 ditto, ...	Removed to be sent to Major Willis.	

The specimens were considered to be set when they did not give way to the blunt point of an iron pin, diameter 60·15 inches.

The experiments were not made simultaneously, though exhibited above as if they were so, for the sake of comparison.

The following is the result of chemical analysis :—

Carbonate of lime, ...	40·05		The sand contained some alumina, probably in igneous combination with the silica. The loss—probably in part from soluble salts, for which no examination was made.
Carbonate of magnesia,	1·24		
Silica, ...	1·80		
Alumina, ...	1·75		
Iron, ...	4·75		
		49·59	
Sand, ...	34·00		
Water, ...	13·36		
Loss, ...	3·05		
		50·41	
		100·00	

The first five ingredients are the active constituents of the mortar. Arranged in percentage of their sum, they stand thus :—

Carbonate of lime, ...	81·1
Carbonate of magnesia, ...	2·3
Silica, ...	3·6
Alumina, ...	3·5
Peroxide of iron, ...	9·5
	100·0

which approaches very nearly to some of the English and French "eminently hydraulic limes."

C. H. DICKENS, Lieut.,
Artillery.

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P. S.—At the suggestion of Lieut. Grindall, I add the method used in the analysis:—

1. One hundred grains of the kunkur in small fragments were placed in a glass flask, and an ounce of strong muriatic acid, diluted with an equal bulk of water, added—the flask being inclined to prevent loss by the effervescence. When the effervescence had ceased, heat was applied, and the liquor boiled for two hours. There remained a greyish white residue, consisting of sand and silica in minute divisions.

2. These were separated by pouring into a vessel 4 inches high, and giving the sand three minutes to settle, after which the finer particles which remained in suspension were decanted off. This process was repeated several times, till all the finer particles were separated. The remaining sand, by this time thoroughly washed, was dried, ignited, and weighed. It amounted to 34 grains.

3. The turbid liquid containing the suspended silica was poured on a filter, on which the silica remained. Washed, dried, and ignited with the filter, it weighed (allowing for the rest of the filter) 1-8 grains.

4. The clean liquor which had passed through the filter (including the washings) was treated with caustic ammonia in excess, to throw down the peroxide of iron and alumina. The precipitate, separated by the filters and washed, was re-dissolved in muriatic acid, and again precipitated by carbonate of ammonia so as to retain by the excess of carbonic acid any lime that might not have been separated by the first process. The precipitate was now washed, dried, and ignited. It gave the peroxide of iron and the alumina together 6·5 grains.

5. The clean liquors from the two filterings (in 4) were mixed, and threw down the line as carbonate. Excess of carbonate of ammonia was added, and when the lime had all separated the liquor was filtered from the precipitate, which, washed, dried, and gently ignited, gave 40·05 grains of carbonate of lime.

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6. To the filtered liquor, from the above, was added phosphate of soda, which gave a slight precipitate of ammonia-phosphate of magnesia. The liquor, after standing 24 hours, was filtered; and the precipitate (washed by dilute solution of carbonate of ammonia), dried and ignited, weighed 1·5 grains, equivalent to 1·24 carbonate of magnesia.

7. The precipitate of para. 4 was re-dissolved in muriatic acid, and the iron precipitated by solution of caustic soda, which retained the alumina in solution. The precipitate, carefully washed, dried, and ignited, gave 4·75 peroxide of iron. The alumina was given by difference.

8. The water was ascertained by deducting the weight of carbonic acid due to the lime and magnesia from the total loss by heat.

9. The loss on this analysis arose chiefly from the alkaline salts not having been estimated.

C. H. D.

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No. 20.

BRICK-MAKING MACHINES AT ROORKEE.

I.—*Memoranda on* HALL'S *and* AINSLIE'S *Brick-making Machines, as used in the Roorkee Brick-fields, by* LIEUTENANT-COLONEL P. T. CAUTLEY, *Director, Ganges Canal Works.*

THE masonry works on the Ganges Canal in the immediate neighbourhood of Roorkee—a town situated 23 miles E.-S.-E. of the town of Seharunpore—required for their completion, in round numbers, 1,000 lakhs of bricks, measuring 12″ by 6″ by 2½″; the period fixed for the completion of these works was six years: a quantity of bricks therefore equal to 166 or 170 lakhs was required annually.

2. Without entering into a detailed statement of the arrangements made for the manufacture of so much material, the collection of so much fuel, or the concentration of such large bodies of labourers at a point near the Sewalik forests and in a country whose inhabitants are chiefly agricultural, it may be sufficient with reference to the heading of this memorandum to draw attention to the mere difficulty of procuring in sufficient abundance *brick-moulders*, or men to make and mould the bricks previously to their being placed in the kilns.

3. The brick-making season is from the 1st October to the 15th of June, and (deducting Sundays and rainy days) two-hundred days in each year may be considered a maximum working period. Supposing therefore that each brick-moulder made 800 bricks per day, one hundred and five men per day would be required to make the number of bricks required for the Roorkee works.

4. To collect so many brick-moulders and maintain them constantly at work, considering that their services were not required for three and a half months in the year, was a matter of very serious difficulty. To be utterly dependent

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on a class of people, moreover, who absented themselves whenever it suited their convenience, and who, knowing how dependent we were on their services, took advantage of their ability to cause interruption by repeated *strikes*, was an evil of very great magnitude; it was an evil in fact that machinery alone could get rid of.

5. During my visit to England in 1846-47, my attention was constantly directed to this point. The tile-machine invented by the Marquis of Tweedale, and other apparatus both for tile and brick-making, were fully appreciated in Europe. Mosul Bey, the French Engineer on the Barage on the Nile, where three brick-machines were at work, had shown me bricks made by this machinery. The question for me to determine was the applicability or not of machinery of the sort above alluded to to our works situated at a great distance from a foundry, and at that time from all practical mechanical aid. In all my enquiries in England I was universally referred to Ainslie's brick and tile machinery. It appears to be in common use, and is exceedingly simple both in principle and construction. In the manufacture of either bricks or tiles, the clay, which has been properly prepared and tempered, is passed through iron rollers, and from these through upright moulds of the form that the brick or tile is to be made. The moulded clay as it then comes out of the latter is cut off by wires into the lengths required. This machine is made of cast iron, with iron spur-wheels, the breakage of which in the Upper Provinces of India would lead to inconvenience. Its simplicity appears to have recommended it to the English brick-makers, but the chance of breakage and the difficulty of replacing cast iron wheels at a distance from a foundry were in some measure opposed to its success at a remote province in Northern India.

6. As the apparatus however had stood the ordeal of much use in England, and was highly recommended, I

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thought it advisable, to ensure progress, to direct two of these machines to be sent to Roorkee; and I did this with greater confidence, as I found that the loss of a few teeth in the spur-wheels did not affect the proper working of the machine, and that by supplying myself with spare wheels the chance of disappointment was small.

7. Up to the present period however we have totally failed in succeeding to get good bricks from this machine of Ainslie's. We have spared neither time nor patience in endeavouring to detect the cause of failure, and I have come to the conclusion that the quality (a point that we shall by practice be able I hope to rectify) of the clay used at Roorkee is not capable of retaining its form under the process required by this machine: clay of every consistency, as regards moisture and tempering has been tried without success. Mr. Scrivener, the manager in England, writes through the Secretary of the Company, that "I am sure, "however, it will do when the nature of the clay is well "understood; the fault of the brick being larger on the "bottom can be remedied by taking out the intermediate "rollers and substituting a plain board covered with a cloth; "and if it comes out rough on the upper side you must put "a piece of wood at the back of the die to hold the clay "back, thus forcing it up to the corners; this I have done "with some clay, and always found that it had the desired "effect."

8. The circumstances alluded to in this extract are those which I pointed out as the results of our trials, *viz.*, that the clay, in passing through the die, or former, was torn and disfigured at the edges, and that the brick itself lost its rectangular form in passing from the die upon the rollers. The latter circumstance evidently arises from the weight of the soft and unsupported material. Laying aside the tearing of the edges, the shape of the brick as turned out from Ainslie's machine in the Roorkee manufactories is

thus, the dotted line showing the die or hole through which the clay is forced :—

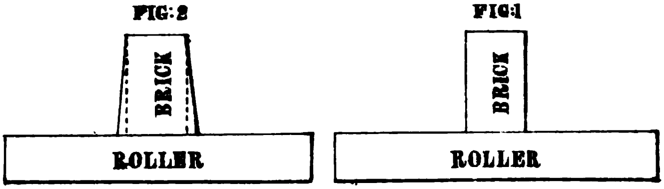

Fig. 1 shows the true form that the brick ought to assume on leaving the die.

Fig. 2 that which it takes in practice.

Figure 2 is admirably adapted to the voissoirs of small segmental arches, and the bricks so made may be turned to account in the construction of drains and culverts.

9. Mr. Finn is now engaged in making further trials with this machine; and I hope that his endeavors will be crowned with the success that he deserves.

10. When inspecting the machinery exhibited at the Agricultural Meeting at Northampton in 1847, I observed a brick-machine bearing the inscription of "Hall's Patent." After further enquiry and proceeding to the Patentee, Ransome, of Ipswich, at which place I visited the brick-fields where the machine was used, I was so much struck with its simplicity and aptitude for use with our native laborers that I ordered one to be sent out to India. The accompanying Reports and Tables submitted by Mr. Finn, the Executive Officer of materials at Roorkee, exhibit the results of operations with Hall's machine during the working season of 1848-49, accompanied by a copy of the printed advertisement and drawing of the apparatus as received from Messrs. Ransome and Co. The progress during the present year 1849-50, has been equally successful.

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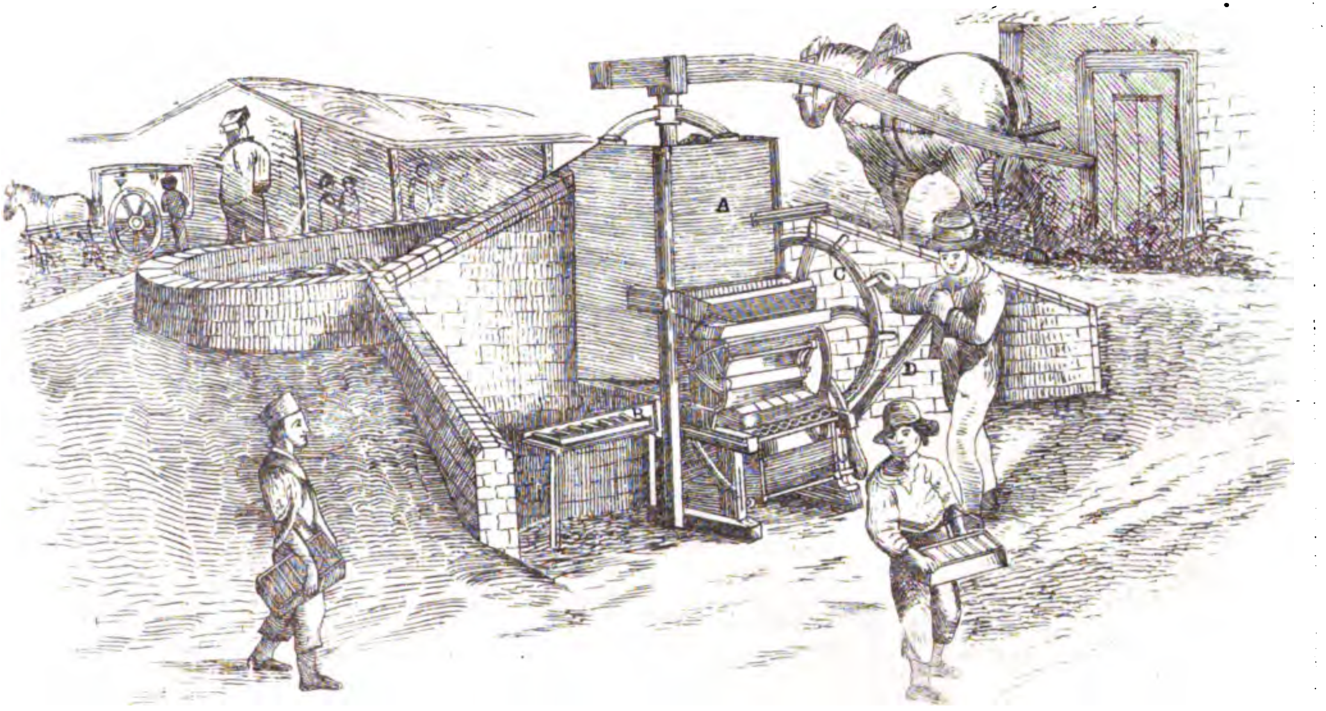

HALL'S PATENT BRICK MACHINE

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11. The description of Hall's machine, which is I believe an American invention—is given in full in the accompanying papers. It may be described thus:—

The clay, properly tempered and worked up in a large reservoir attached to the pug-mill A, passes through the mill into a tray B, consisting of moulds for five bricks. This tray B, is pushed in by hand (as shown on the left of the sketch) and rests upon a platform with horizontal motion gained by the use of the wheel C. By this wheel C, the tray when filled with earth from the pug-mill is pushed forward, until it comes into position under the pressing apparatus, the pressure being gained by the downward movement of the lever D. The tray being relieved from the pressure, is taken out by the hand from the front of the machine and carried to the drying-ground, where it is emptied and brought back again for further work. This process goes on as rapidly as trays can be supplied.

12. In bringing a machine of this sort into use with our native establishment, it was natural that interruption should take place in the commencement. Mr. Finn however had taken the precaution of drilling a party of bildars into the motions of the machine for some time before he allowed bricks to be made with it. Brick-making therefore was commenced with very tolerable expertness, and with the exception of slight delay from occasional breakage to the machine and from time required to gain experience on the proper state of moisture in which the clay was to be supplied from the pug-mill, the machine has proceeded steadily at its work. It will be observed that the number of bricks turned out daily from the period when tolerable practice had been gained averages 10,000, with a maximum of 11,670—an amount fully equal to that held out in the advertisement.

13. In the Roorkee fields twenty-eight men and four bullocks per day are employed. This establishmenti ncludes excavating, watering, and carrying the mould to the

pug-mill reservoir, in addition to the working of the machine. The establishment noted in the prospectus as used in England and America, of one horse, two men, and two boys, can hardly include the labor required in digging and preparing the earth. We have found bullocks preferable to horses, and use the former accordingly. In all other respects the manufacture of bricks is carried on exactly as it would be in an English brick-field.

14. The size of the brick is 9″ by 4″ by 3″, the same as used in England. We have succeeded in burning them sufficiently, and the massiveness of their proportions secures them from breakage, which is an evil that we greatly complain of in 12″ by 6″ by 2½″ or 2″ bricks, which we have been in the habit of using.

15. The cost of bricks as turned out by Hall's machine is Co.'s Rs. 54-12-2 per lakh—a rate that will in all probability be reduced. The cost of making the larger brick has been Co.'s Rs. 91-0-10 per lakh. The cost of the machine in England was £96, and the total cost at Roorkee Co.'s Rs. 1,561-8-7.

16. In consequence of the great success attending upon the use of this machine, we have made* two others, in all essential respects similar. One of these is at work at the Mahewur brick-fields, on the left flank of the Solani aqueduct; and the other at Dhunowree, where the Rutmoo works are in progress.

17. A reference to the tables which accompany this paper will bear me out in my opinion that the value of this machine is established as a most efficient and useful accessory to a brick manufactory in India.

P. T. CAUTLEY, Lieut.-Col.,
Director, Ganges Canal Works.

Mussoorie:
The 29th April, 1850.

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* A machine of this kind made at Roorkee cost about Rs. 500.

II.—Report *by* Mr. James Finn, *Executive Officer, to* Lieut.-Colonel P. T. Cautley, *Director, Ganges Canal, dated Roorkee, 25th June, 1849.*

Sir,—I beg leave to enclose herewith an abstract of the work-people employed, and of the number of bricks made daily by Hall's patent machine.

2. The machine was set up in October, 1848, and placed in charge of Serjeant Durrant, whose first object was to learn to work it himself; this he very soon accomplished, and he then taught a party of bildars how to use it; but owing to the stupidity and awkwardness of these men, the machine was continually breaking for the first six months after it was set in progress. The frequent stoppages to our work on that account were very disheartening: nevertheless, Serjeant Durrant persevered in his endeavours to give the machine a fair trial; he encouraged the bildars, with whom he occasionally took a spell at the wheel, and the results have been that we had the satisfaction of seeing it work on steadily for the last three months, and of counting 11,670 bricks made by it in one day, which is about equal to the best turn-out obtained in England or America from a similar machine.

3. The bildars employed on the machine were placed in the following order, viz.:—

11 excavated the clay and carried it to the pug-mill cistern: average distance 130 feet.
2 supplied the cistern with water and cleared up the drying-ground.
3 filled the pug-mill from the contents of the cistern.
1 cleaned and sanded the moulds preparatory to passing them into the machine.
1 served the machine with empty brick-moulds.
1 on the wheel pressed the mixed clay into the moulds.
1 on the lever forced out the mould.
1 on the mister, or strike, cleaned top of the bricks, and raised the moulds to heads of the carriers.

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6 carried the loaded moulds from the machine to the drying grounds.

1 relieved the carriers of the moulds, and placed the bricks in regular lines on the drying ground.

—

Total 28 bildars.

4. The size of a machine-made unburnt brick is 10″ by 4⅞″ by 3⅛″ = 148¼ cubic inches. For 11,000 of these about 920 cubic feet of earth is required; therefore each of the eleven bildars employed on excavation, &c., had to dig, pulverize, and carry to the pug-mill cistern about 90 cubic feet of clay.

5. Bricks made by the machine for the last month have cost on an average Rs. 54-12-2 per lakh; and the rate of our bricks with the hand on pucka terraces at Roorkee, during the same moulded month (May, 1849) was Rs. 91-0-10 per lakh; pay of the bildars, &c., for Sundays, in both cases included:—size of the last mentioned brick, 12¼″ by 6¼″ by 2⅝″.

6. In the early part of the current month, twenty-eight bildars at four rupees, with four bullocks at five annas each made on an average 11,046 bricks per day by the machine; and at the same time to make 11,200 moulded bricks the following were required, viz.—

Moulders @ Rs. 6 per month,	... ...	14
Bildars @ Rs. 4 per month,	... ...	39
		—
	Total	53 men.

7. At the commencement it was attempted to work the machine by horses, but they were found not to answer so well as bullocks. Four of the latter animals were employed daily cutting and mixing the clay in the pug-mill; two bullocks worked from sun-rise until noon, and two more from 2 P. M. until dusk of evening.

8. Consequent on the many times the machine was broken, we had made by it only 9,76,016 bricks in the past working season; nearly the whole of these have been stacked

into a large native kiln, which is at present being fired. Some pucka bricks however taken out at its mouth seem close-grained, compact, and strong.

9. I beg to add that I have not included the expense incurred on repairs of the machine in the cost of bricks produced in the accompanying abstract.

I am, &c.,
JAMES FINN,
Executive Officer of Materials,
Northern Divn. Ganges Canal.

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III.—Abstract of the Work-people Employed, and of the No. of Bricks made monthly at Roorkee, by Hall's Patent Machine.

Month.	*No. of days' work.*	*Bildars at Rs. 4 per month.*	*Bildars at Rs. 3-8 per month.*	*Chuprassees at Rs. 5 per month.*	*Horses at 5 annas per day.*	*Bullocks at 5 annas per day.*	*Bricks made in the month.*	*Cost of labor.*			*Cost of sundries.*			*Total cost.*			*Average cost of Bricks per Lakh.*			*Remarks.*
								Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.	Rs.	As.	P.	
October, 1848, ...	9	79	—	9	10	—	12,795	15	12	10	4	10	11	20	7	9	160	1	6	
November, „ ...	17	52	307	17	24	32	65,960	63	1	4	5	3	9	68	5	1	103	9	2	
December, „ ...	4	20	92	4	6	10	15,170	18	9	9	0	0	0	18	9	9	122	10	9	
January, 1849, ...	18	444	—	16	—	48	89,290	77	5	2	1	14	2	79	3	4	88	11	4	
February, „ ...	8	203	—	—	—	24	45,210	37	10	3	2	6	3	40	0	6	88	8	9	
March, „ ...	12	307	—	—	—	40	86,890	53	10	7	2	3	8	55	14	3	64	5	2	
April, „ ...	30	786	—	—	—	88	2,18,441	136	4	9	9	12	6	146	1	3	66	14	0	
May, „ ...	31	868	—	—	—	108	2,87,410	149	12	0	7	9	10	157	5	10	54	12	2	
June, „ ...	17	476	—	—	—	56	1,54,850	83	3	9	0	6	0	83	9	9	53	15	11	
							9,76,016							669	9	6	68	9	8	

Roorkee, 23rd June, 1849.

JAMES FINN, *Executive Officer of Materials, N. D., Ganges Canal.*

NOTE.—Half-pay for a Tindal at Rs. 8 per mensem charged all through.

IV.—REPORT *by* MR. JAMES FINN, *Executive Officer of Materials, Northern Division, Ganges Canal, addressed to* LIEUT.-COLONEL P. T. CAUTLEY, *Director, Ganges Canal Works, dated* ROORKEE, *7th May,* 1850.

SIR,

THE following circumstance is, I think, well worthy of being noticed in your forthcoming report on the manufacture of bricks in the Northern Division of the Ganges Canal.

2. Previous to the setting up of the first (Hall's Patent) machine, brought out by you from England, the brick-moulders were the most untractable and troublesome class of men on our works. We had then about 150 moulders employed daily at Roorkee and at Mahewur, and their combined and frequent efforts to evade the doing of a fair day's work, or to extort from us a higher rate of pay, caused much anxiety to all concerned in the manufacture of bricks. If an attempt was made to coerce a moulder, or even if fault was found with the quality or quantity of work performed by one or more of them, the whole would quit working collectively, take their moulds in their hands, and walk off to their huts, in spite of all remonstrance. I can well remember that they served us in this manner twice in one week at Roorkee. But since the machine has been erected and the moulders saw us turn out from 10,000 to 11,000 bricks daily, quite independent of their aid, from having been the most unmanageable, they have become the most docile of all our work-people. At present we have about 200 brick-moulders employed at Roorkee, Mahewur, Dhunourie and Suleempoor: each moulder formerly made between 700 and 800 bricks on our terraces, and at present every man turns out 900 very superior ones, such as you have seen on all our brick-fields in the course of your late inspection. The pay of each moulder formerly who did what was then considered full work averaged Rs. 6-8 per month; at present we pay Rs. 6 only, and the whole

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of them work on cheerfully and steadily. Taking all this into consideration, I am of opinion that our possession of "Hall's Patent Brick-making Machine" has proved an immense benefit to the works.

I am, &c.,

JAMES FINN,
Executive Officer of Materials,
Northern Divn. Ganges Canal.

V.—Extract *from the description of* Ainslie's Brick-making Machine; *by* Wm. Gordon, *Secretary of the Company of Patentees.*

By these machines (for which prize gold-medals were given by the Royal Irish Agricultural Society, at their meeting at Balinasloe, and by the Highland and Agricultural Society of Scotland, at their meeting at Dumfries, and also at Inverness), draining-tiles and pipes of the most perfect form are produced at a much cheaper rate than by any other machine hitherto invented.

The peculiarity of these machines is that a continuous stream of clay passes between the cylinders, and presses through the dies in the most perfect manner pipes, tiles, or bricks of any form; and the apparatus is so arranged as to cut to any length and perfectly true. They can be driven equally well by steam, horse, or hand-power.

The machines are so simple in their construction that with common care they cannot get out of order, and any country mechanic can easily repair them; and they are the only machines by which the hollow brick, so highly approved for building and horticultural purposes, can be made. The quantity of bricks or tiles made depends upon the speed at which the machine is driven, varying from 4 to 15,000 per day.

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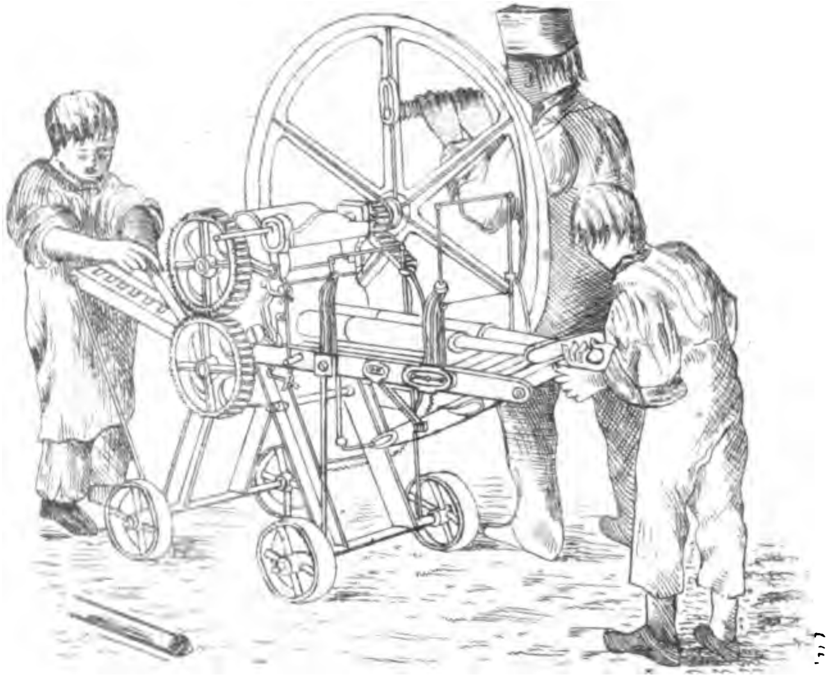

AINSLIE'S BRICK-MAKING MACHINE

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PRICES.

	£	s.	d.
A hand-power machine, including two moulds or dies, ...	30	0	0
Additional dies, @ 10 shillings each.			
A horse or steam-power machine, including 2 dies, ...	50	0	0
Additional dies, @ 15 shillings each.			
Horse-power for ditto, ...	25	0	0
A machine for making solid bricks complete, which will turn out from 10 to 15,000 per day of 10 hours, ...	60	0	0

VI.—EXTRACT *from the description of* HALL'S PATENT BRICK-MACHINE : *manufactured by* FREDERICK RANSOME, *Ipswich.*

The following particulars are copied from an American paper, printed at New York, relating to a brick-machine for which Mr. Frederick Ransome, of Ipswich, is the Patentee for England. The machine can be seen at work at the Patentee's, Flint Wharf, Ipswich.

The engraving represents a machine for making bricks, patented in the United States and Great Britain by Alfred Hall, of Perth Amboy, New Jersey; showing a pit in which the clay is soaked, the mill for grinding it, and a moulding machine as attached when in operation.

The most recent and approved method of constructing a brick-yard is as follows :—

The yard should be graded so as to extend from the clay bank one hundred and fifty feet, nearly fifty feet being cut off from the side opposite the clay bank for kiln-ground; the part between the kiln-ground and clay bank being the drying floor, should, if not made upon a clay foundation, be faced with clay, made smooth and solid, and sufficiently inclined to carry off the water immediately after rain. On the side of this floor next the clay and opposite the kiln-ground are placed the pits or vats in which the clay is soaked.

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These should be equal in size to one-half of a circle nineteen feet in diameter and three or three and a half feet deep, made water-tight, and either of wood or brick (according to climate and convenience)—the front or machine-side being on a line with and facing the drying floor, and placed at distances, each to occupy or accommodate from sixty to eighty feet of the drying floor. The bottoms of the pits are on a level with the drying floor: consequently they rest on an embankment near three feet higher than the drying floor. At the centre and in front of the pit stands the grinding mill, a plank box resting on a solid foundation, six inches higher than the bottom of the pit; it is three feet four inches square and four feet high, projecting fifteen inches over its foundation, so as to permit a portion of the moulding machine under the front of it. In the centre of this box is an upright shaft, in which knives are placed, and on the top of which is the sweep or lever to which the horse is attached; at the bottom and in front is an opening for the mortar to pass into the chamber of the moulding-machine. The bottom of the frame of the moulding-machine will stand about two and a half feet lower than the drying floor. The horse-path will be thirty-two feet in diameter (the sweep being sixteen feet from the upright shaft to the place of attaching the horse), passing round the pit and all the machinery, inclining three feet from the back of the pit to the drying floor in front, from which point an inclined plane is graded down to the bottom of the moulding-machine, for the convenience of off-levers in going to and from it. A box containing sand for moulding is placed near and at the left of the machine.

The clay, unless it is soft like putty or dough, works best generally to plough and dry it, putting the water in the pit first. The dry clay is then shovelled in—not in heaps, but scattered so that every shovel-full shall go into and under the water, scattering the clay continually in the deepest, and using up the water, and rising above it

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only when the pit is full. It is left thus to soak over night, when it is ready to grind.

Having thus prepared the yard,—with the kiln-ground on one side and the machine on the other, the drying floor between, and a vat containing water convenient to each machine to soak and wash mould in, and having dried and sifted through a fine sieve a quantity of fine sharp sand (the particles pointed and flat), for moulding,—we are ready to commence work. It is the work for one man to shovel the clay from the pit into the grinding mill; he adds a little water in the mill, as it may require, keeps in as even temperature as possible, keeps the mill full and the horse in motion. The mortar passes continually as it is ground out of the opening in the mill, directly under a revolving press, into the chamber of the moulding machine, at the bottom of which is a grate, under which rests the mould, on rollers, in front and rear of which are grates—the grates and rollers, forming the top of the main carriage, the sides of which are kept about one inch from the plates by steady pins, which serve also to keep them from oscillating, and having (at their rear end at the outer edge) iron rails: the whole being constructed so as to allow all surplus sand and rubbish freely to riddle through. It is supported in rear by a girt, suspended from the plates by screw-bolts, the front resting on rods connected with a shaft, to which is attached the lower small lever, which, being drawn forward, instantly drops the front of the carriage and releases the moulds from obstruction by stones or otherwise. On the iron rails runs a moveable carriage and an axle having wheels to run on the rails, to which is attached a crutch lever, curving so as to connect with the axle; thence passing forward, is connected with an arm or lever extending to a shaft below, to which is attached the large lever, which attaches this moveable carriage, so as to force the empty mould under the chamber and the full one out on to the front of the carriage. The upper small lever operates

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the press by means of a shaft with pinions operating in segments.

The operation of moulding is simple. The mortar passes directly from the grinding mill, in a confined state, into the chamber of the machine, through the grate into the mould. The press lever is then brought forward, pressing sufficiently to fill out the corners, the pressure being kept on till the mould is filled and started by means of the large lever. As soon as the full mould starts the press lever is let go, and when the mould is drawn out both the levers are replaced ready to repeat the operation. The moulder then smooths off the upper surface of the brick, by drawing a strike (the mettle edge of which may be wet in the small box in front of the larger one resting on the machine) across them, cleaning off the box; the lower lever is used only to drop the carriage when the mould is obstructed, and then immediately replaced.

From four to five hands compose what is called the moulding gang: the shoveller (called a machine-tender), a moulder, and from two to three off-bearers. These must all move on regularly and keep up with the horse; they will make from eight to fourteen thousand bricks per day—the number depending upon the size of the brick and the convenience of the works. New moulds should be thoroughly soaked before using. The off-bearers, while the moulds are wet, sand them by dipping sand from the sand-box, and shaking it till every part of the inside becomes coated, when each puts an empty mould on the machine directly back of the full one, and between it and the axle, and then takes the full one from the front in such a manner as to place the side coming last from under the grate next to him. Carrying it to the drying floor, he carefully turns it on the floor, bottom up, leaving the brick in rows running from the kiln ground towards the machine. He then immediately returns, re-sands his mould, and repeats the operation.

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When the business is carried on to much extent, it should as far as practicable be arranged into a system: the work should be so arranged that each hand should be kept at the same kind of work. The departments of labour and terms applied are as follows,—viz., the teamster, pit-filler, moulder, temperer, off-bearer, and yard-hand. The teamster ploughs and scrapes the clay and does all necessary team work; the pit-filler delivers the clay and fills the pit; the temperer shovels it into the grinding mill; the moulder makes it, making from five to six bricks at each impression; and the off-bearers carry the bricks and lay them on the floor to dry; the yard-hands take care of them from this stage till they are set in the kiln ready to burn. Each man is employed as a suitable hand to do one of the various kinds of work, and expects to be kept at that kind of work through the season, and each becomes skilful in his particular department. It is found that men will do more work, do it better, with greater ease, and be better satisfied to be kept constantly at one kind of work, than changed from one kind to another; the muscles called into action by a particular kind of work soon become as the common saying is seasoned to it, so that they are not easily fatigued; but change the work, and other muscles are called into action, which soon tire. Brick should not be taken from the yard until dry, and when dry should be taken directly from the yard and set in the kiln. It is very little if any more work to set them at once in the kiln than to carry and bake them (as the practice is at the south) under sheds, and they will dry more thoroughly on the yard than in *hakes* under a shed where they cannot receive the sun; and it is about as much work to take them from the shed and put them in the kiln, as from the yard. If room is wanted to keep the moulding gang at work, the yard-hands will *hake* them on the yard, running the hakes from the kiln towards the pits; bricks are then laid between these *hakes* to dry. This pro-

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cess saves handling, the brick becomes better dried, and the corners and edges less injured, than by the other process.

What is called the burning-shed is constructed by setting two rows of posts to stand on each side of the kiln, from 18 to 20 feet apart, ranging so as to accommodate the arches, which will vary according to the length of the brick, leaving five or six arches between the posts; these posts should rise three feet above the kiln; plates should be framed on the top, and connected with iron rods passing from one plate to the other over the kiln to keep them from spreading by the weight of the roof; rafters placed about six feet apart rest upon these plates, ribs or slates are placed across the rafters on which rests the roof of boards; on either side of these posts and at a distance of ten or twelve feet therefrom are set two other rows of posts having plates framed on the top sufficiently high to pass under with teams, &c. These form wings to the main shed and should be covered permanently. When a kiln is burning and becomes so hot as to endanger the roof of the main shed, the boards should be slid therefrom on to the wings and replaced when the kiln is sufficiently cool.

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No. 21.

DEPOSITS OF GRAPHITE.

REPORT *on the* DEPOSITS OF GRAPHITE *near Almorah, by* MAJOR H. DRUMMOND, *on special duty. Dated 24th October, 1850.*

THE occurrence of graphite in the Himalayas was officially reported on in 1826 by Captain Herbert, Superintendent of a Mineralogical Survey. No bed or mass of the mineral however was brought to light, as will be seen by referring to Captain Herbert's report.*

When at Almorah last year, I observed traces of graphite in the rock on which my house is situated, and was led to examine the ground in the neighbourhood, the result of which was the discovery of beds of the mineral in the mountain of Kaleemut, about three miles north of Almorah, which I shortly described in a former paper. From one of these deposits, at the depth of a few feet, were obtained the specimens I had the honor of forwarding to the Most Noble the Governor-General.

On my appointment by His Lordship to the prosecution of the research, I continued excavating in this quarter; but no improvement in the mineral taking place, I ultimately abandoned the several openings made. The principal of these is an open working on the eastern side of the hill, measuring 65 feet horizontal and 34 perpendicular. To carry on the examination at this point, it would be necessary to sink a shaft to ascertain the character of other beds, which no doubt exist underneath.

After examining the ground in various directions, I selected two localities where a more favorable appearance presented itself, and to avoid being tedious confine my remarks to these at present.

The first is at Gurjolee, near the village of Bultee, about two and a half miles east of Kaleemut and five from

* Published in *Asiatic Researches*, Vol. 18.

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Almorah. The deposit worked here is observed when following the beds of plumbago, as they encircle the upper part of the valley of Mutteana, after leaving Kaleemut. The graphite at this point occurs in the form of nodules, which differ considerably from those hitherto obtained at Kaleemut, being finer in appearance and of small size, generally not larger than a walnut. On the first specimens obtained, Mr. O'Shaughnessy, Chemical Examiner, expressed an unfavorable opinion; but I prosecuted the working, from the impression* that their character gave promise of a better quality being discovered at a greater depth. This impression has to a certain extent proved correct. Specimen No. 1 exhibits the graphite at the surface; No. 2, a change commencing at the depth of a few feet; from Nos. 3 and 4 it will be observed that still lower down it is more compact and less earthy, and that some of the nodules exhibit the metallic lustre on the fracture. This mine has been worked to the depth of 46 feet.

The same description of nodular graphite I have since found cropping out in several directions, but always in small quantities—each deposit being only three or four inches in breadth.

The other locality alluded to is near the village of Pulseemee, about three miles from the Bultee mine, and the same from Almorah to the eastward. There are numerous deposits here. The first opened crops out on the bank of a small stream in a deep ravine, and is composed of the mineral in tabular masses displaying metallic lustre. I was prevented by the water from striking downwards, and therefore drove a gallery 70 feet in length along the course of the lode† into the mountain, or rather shoulder of the

* I have also understood that the purest description of graphite from Borrowdale generally occurs in small pieces.

† A technical term used in mining, to denote a course of ore, whether in the character of a bed conforming with the strata of the country or a vein traversing the same.

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mountain. The setting in of the rains however having swelled the brook and flooded the mine, I did not think it worth while to keep it open, as no apparent change had taken place in the mineral in that direction. About 200 feet lower down, the stream is joined by a smaller one, and in the bed of the latter before the rains commenced I worked another deposit containing two layers of graphite. The lower is from six to seven inches in breadth and displays the metallic lustre; the upper two feet thick, of a much coarser character, and the metallic lustre is absent. The latter appears in the shape of a large solid mass crossing the bed of the smaller stream. A portion of this was loosened and carried down by the water, a fragment of which now lying about fifty feet from the spot measures five feet six inches in length, two feet four inches in width, and two feet in depth. The remainder of the mass at the working still measures thirteen feet by ten. On the opposite side of the stream another deposit was found, five inches thick, with the metallic lustre; and lower down very large nodules exist in a bed of rock overhanging the bank. I subsequently mined another deposit close to the first-mentioned one, and here the metallic lustre is also apparent; but the masses differ in some respects from the other, being generally of a flattish nodular shape. They also vary considerably in quality—the greater portion being very coarse and stony, and some on the other hand much finer. For the reason stated above, namely, the proximity of the stream, I was obliged to cut into the mountain in the same direction, and not finding the mineral improve I discontinued it at eleven feet.

About the same time I came upon a deposit of nodules, and found along with them a mass of what appeared to be a broken nodule with considerable metallic lustre. This last presented a promising appearance; but I was again prevented by the water from mining on the spot, and cut the surrounding rock without coming on anything similar.

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I then uncovered the surface of the opposite bank, to observe the appearance of the strata underneath, and laid open a deposit of small nodules similar to those at Bultee. As at that place, all at the surface were earthy-looking; but after following the deposit into the interior of the mountain, the metallic lustre became visible in some of the nodules, about ten or fifteen feet from the entrance. I have only as yet mined this to the distance of twenty feet, in a contrary direction to the last-mentioned excavation.

In order to obtain a better view of the strata and lay open any other deposits that might exist, I then removed the surface to a distance of 100 feet on both sides of the stream, and whilst doing so exposed three other beds of the mineral, marked 3, 4, and 5* in the accompanying sketch, and several large nodules close to the first mine (marked A). One of the latter shews the metallic lustre slightly. The western side of the ravine below the mine (marked C) I have been unable as yet to expose, from the great depth of soil and accumulation of boulders of rock.

The whole of the deposits examined in the vicinity of Almorah are imbedded in a mica slate formation. The rocks in which graphite is usually found are granite, gneiss, mica slate, clay slate, &c., and the lowest of the silurian rocks. It is also found in the coal formation.

Avoiding more lengthened details, I proceed to notice the conclusions which my observations have led me to form.

First—as regards quantity.

It is evident that the deposits of graphite around Almorah are on a very extensive scale. I have found nodules of all sizes: some not exceeding the size of a pea, and the largest weighing 163 pounds. These exist in deposits a few inches thick, as at Bultee, Mutteana, and Sulla, about seven miles from Almorah; at other times in great beds of rock, twelve feet and upwards in breadth, having the appearance so to speak of shot in a wall. The latter

* None of these show the metallic lustre at the surface.

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sometimes contain nodules varying from one to five and six inches in diameter, as at Kaleemut and Punniala, beyond Bultee; others contain those of largest size, as at Mutteana, Pulseemee, and Sherar, beyond the latter. The graphite also occurs, as described above, in large tabular masses at Pulseemee, Sherar, Berowra, and Pithownee.

Some idea may be formed of the magnitude of these deposits by the breadth of carburetted rock in which those at Kaleemut are found. This may be well observed on the ridge of that mountain, where the formation crosses the road to Hawilbagh. It measures 1,800 feet, and allowing for the winding of the road may be reckoned 1,600.

Whilst opening the ground at Pulseemee to observe the character of the mineral, without reference to quantity, at mine A, and the smaller lode described as in the bed of the stream, I turned out upwards of 15 tons. Had quantity only been looked to, and a continuous working been carried on at this spot, I have no doubt 100 tons might as easily have been obtained.

Secondly.—as regards quality.

Though none of the graphite hitherto obtained can bear comparison with the specimen of pure Cumberland plumbago transmitted by the Hon'ble Court of Directors as a standard, * I do not consider it improbable that a valuable article may yet be discovered. This belief I ground on the following reasons:—

1. The Borrowdale mine, in Cumberland, has been worked for upwards of two centuries, and of course any specimens from the present workings must be from a considerable depth. A fair comparison therefore cannot be drawn between these and any procured from the workings here, which as yet must be looked upon as entirely superficial.

2. All that was formerly known regarding Himalayan graphite was the fact that it existed in the form of no-

* The specimen is now deposited in the Museum of the Agra College, where it is available for reference.

dules; that the fracture surface was dull and earthy-looking, never exhibiting the metallic lustre till cut or rubbed. It will now appear by specimens from Bultee and Pulseemee that even at a short distance from the surface several of the nodules bear a considerable lustre on being fractured. It has also now been discovered for the first time in tabular masses.

3. The deposits already opened differ materially from each other even at the surface. What they may prove to be on deeper mining has yet to be ascertained.

4. There are many localities in the surrounding country still unexamined, and the quality of these cannot be determined by any already laid open.

5. On a small selected specimen from mine A, at Pulseemee, Mr. O'Shaughnessy gives the following opinion:— "Of the two samples sent, one is of very good quality and stands fairly a comparison with the plumbago used for manufacturing the *second* quality of drawing and office pencils. In the color and quantity of ash, the time of combustion, and other particulars (more technial than chemical), your plumbago (the card-box sample) and *ordinary* Comberland differ but little from each other."

To conclude—while the discovery of such pure material as that transmitted by the Hon'ble Court would be a truly valuable one, it must be borne in mind that there are other varieties, which though containing a portion of earthy matter would still be highly remunerative—for example, the rock plumbago of Cumberland, alluded to by Mr. Brockedon, which he mentions having bought for "less than £50 per ton."*

There is little doubt however that these desposits will ultimately prove of value wholly unconnected with the manufacture of pencils. It seems highly probable that the process mentioned in the accompanying memorandum by Mr. Rose, Mineralogist, namely, the separation of foreign

* Letter from Mr. Brockedon to R. Phillips, Esq., 16th April, 1850.

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substances by pounding and washing—might be carried on with advantage in a district like this.

The abundance of water-power in every direction would afford the facility necessary for working small mills of simple construction, and these could be erected at a trifling expense. I am yet in ignorance what proportion of the pure mineral must be contained in the plumbagos which pay for this process; but even should they prove to be of finer material than any that exist here, it is not unlikely that the great abundance of the article may compensate for the superfluity of extraneous matter.

The Americans use this substance (procured from a mine in North Carolina) in various ways, "being ground with oil for painting the wooden roofs of their buildings, and being used in different ways as a preservative from decay, and also from fire, to which its incombustible character well fits it."

I have had experiments made to ascertain whether any preparation of this kind would prevent the ravages of white ants* in combination with the advantages above-mentioned. Hitherto these have failed, but I have directed further trials to be made, which I am not without hopes may succeed. Conductor Wallace is now trying if the mineral mixed with oil may be rendered applicable to the protection of the wood and iron work of bridges, in place of the expensive coal-tar now in use, which is found on experience to melt with the heat of the sun in the valleys.

One of the most important uses to which graphite is applied is to diminish the friction of machinery, and for this purpose alone it must eventually be greatly in request in this country. When the other important mineral resources

* White ants do not attack wood when covered with the black lead, if arsenic be added. Since writing the above, I have ascertained that no white ants will attack timber covered with plumbago, when the latter is mixed with oil extracted from the Deodar Pine. This being a less expensive process than the above and not so objectionable, is I think worthy of consideration.

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are opened up, it is obvious that the large amount of supply of this substance must prove highly advantageous.

H. DRUMMOND, MAJOR,
On Special Duty.

ALMORAH: 24*th October*, 1850.

Remarks of Mr. Rose, Mineralogist, with reference to specimens of Graphite forwarded to Major Drummond.

Graphite is applied to several purposes. When very fine, compact, and of a sufficient cohesion, it is cut up for drawing-pencils. When the texture is loose, or it is otherwise of inferior quality, it is ground down and deprived of foreign substances by washing, as ores of metals are prepared for smelting. The powder thus purified is then used for various purposes, such as crucibles (being refractory or infusible by heat), for burnishing iron, and reducing the friction of machinery.

A new method is now adopted for making artificial pencils, which are scarcely if at all inferior to those sawn out of the finest blocks. The dust of such fine material as Nos. 4, 8, and particularly No. 10, properly prepared, is subjected to vast hydraulic pressure (several hundred tons), and thus acquires the compactness and solidity necessary for the best purposes.

The best kinds of graphite may be known by a pale lead-blue color, high lustre, unctuosity, and inferior specific gravity.

The first nine specimens will answer for pencils, most of them sufficiently pure and compact to be divided for that purpose.

All the varieties sent may be used, even No. 13, though connected with much matrix, as it can be deprived of this by grinding and washing.

All the varieties of this substance must continue in demand and bring remunerating prices if the expense of mining and conveyance should not be too great.

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NATIVE LIBRARIES AND SCHOOLS.

No. 1.

ESTABLISHMENT OF VERNACULAR LIBRARIES.

LETTER *No. 24, dated "Camp Boregaum, 1st February, 1849.—Addressed by* LIEUTENANT H. L. EVANS, *Political Assistant in Nimar, to* R. N. C. HAMILTON, ESQ., *Resident at Indore, respecting the Establishment of Native Libraries in Nimar.*

SIR,—With reference to the 21st paragraph of Mr. Secretary Allen's letter, No. 5085, dated 16th October last, requiring certain information regarding native libraries in Nimar, on receipt of which the question of granting assistance towards them from Government would be entertained, I have the honor to offer the following remarks.

2. The project of establishing native libraries originated with Captain French. It was his object to as far as possible promote the spread of education, and to this end nothing could tend more than the encouragement of a taste for reading amongst those capable of doing so, that by their example others might be induced to learn: moreover, the taste for reading having been acquired or increased, the attention of the natives may perhaps then be turned towards works capable of affording instruction and enlightening their minds. The geography and history of their own and other countries, works on practical husbandry and mechanics, with many subjects on which the ignorance now prevailing is most intense and lamentable, it is to be hoped may be made known to them.

3. The sum of Rs. 1,397 was collected by voluntary contributions—of-course induced by Captain French's persuasions and recommendations; and books (of which a list accompanies) procured from Agra and Bombay. In the selection of the works the people subscribing were

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entirely uninterfered with. A list was circulated of books obtainable, and from that they made their selection. It was judged unwise at first to attempt to influence their choice.

4. So far, then, people might be inclined to say that what has been done was nothing in the right direction; that the great majority in subscribing had merely done so to please their local superior; and that the books, procured and perhaps once looked at, would be consigned to some corner and forgotten; and the whole regarded as merely a crotchet, useless and impracticable. But when I state that in three places* the people have voluntarily, without a hint from myself, without in fact my being aware of it until done, come forward with a sum of money themselves and requested some small assistance from Government towards building a place where the books might be kept, and rear a reading-room or library: in fact, it must be conceded that an advance has taken place. They have also proposed monthly subscriptions, to which I have promised support.

5. In several places the inhabitants have without the assistance of a rupee from Government built school-rooms; some in villages where schools did previously exist, but where there was no good place for them to meet in. In two instances they have been built by the inhabitants, and a petition then sent in for an instructor to be appointed. This shows an appreciation of education.

6. A great dearth of books for the school is experienced; but that is giving way since the establishment of a lithographic press at Mundlaisur. In one school, where the inhabitants had built the room and paid the teacher themselves, I found the only book to be a Hindee translation of the ten commandments, given them by a Native Missionary some six or eight months back.

* Burwai, Kundwa, and Bahadurpore.

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7. It must be observed that the native libraries and schools are entirely distinct—the latter are Government, the former property of the people themselves. Any assistance towards them would be most thankfully received: perhaps best rendered by a present of books of the nature mentioned in my second paragraph—the simpler the better—and by permission to me to assist them in building their reading-rooms. The amount granted need be very small, and shall be specified if His Honor the Lieutenant-Governor should be pleased to receive the request favorably.

8. I am conscious that much more might be advanced upon this subject than what I have stated, and that I have not done justice to it. It is impossible to too highly estimate the value of an increase of education. Not that perhaps very much is accomplished by either the native libraries or by the vernacular schools; but still something is done, and that may improve. With reference to the latter (the schools), I may mention that as a first step the qualifications of the teachers have been attended to.

Having procured a very intelligent man from the Deccan, educated at the Poonah College, the several "*pundyas*" (teachers) have been, and are being in their turn, sent in to Mundlaisur, and there to a certain extent taught their duty. Both in this and in the preparing school-books, Mr. Conlan, the Deputy Collector, has given great assistance.

I have, &c.,

H. L. EVANS,

Political Assistant in Nimar.

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E. E.

NIMAR AGENCY:
The 5th February, 1849.

T. CONLAN,
Deputy Collector.

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No. 2.

REPORT ON A SCHOOL OF INSTRUCTION FOR THE NATIVE AMLAH.

Letter from R. N. CUST, ESQ., *Collector of Banda, to* W. MUIR, ESQ., *Secretary to Government, North-Western Provinces. No. 663B.—Dated 20th October, 1854.*

I TAKE the liberty of requesting you to lay before His Honor the Lieutenant-Governor the following report on a School of Instruction for the Native Amlah in revenue law and practice, which was opened in this district during the months of July, August, and September of the present year, and certain remarks on the whole subject of patronage.

2.—My objects have been to test the knowledge of native employées of Government of their duties, to instruct them where they are deficient, to weed out those who may clearly be unfit for further employ, and if possible to arrive at some principles and system upon which the distribution of patronage may in future be guided. I have long seen with regret that the mode of filling up vacancies in the numerous and valuable posts in the Revenue Department is far from satisfactory; that good men have no opportunity of bringing their merits to notice; that gross inefficiency is often shielded by obscurity; and that it is better to be related to a native deputy collector, a serishtadar, or one of the sudder amlah, than to have good abilities or have done good service. Great checks are now properly placed on hasty dismissals; but there is absolutely *no check on hasty appointments.* Large family cliques have thus introduced themselves. I can only speak from public report as regards other districts; but I have more than suspicion as regards my own that appointments were sold by the late collectory serishtadar, and a regular tariff fixed.

3.—At the same time the gross ignorance of many employées is most lamentable. Imperfectly educated, they can just

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read and write: they have neither the opportunity nor the desire to improve themselves; nor do they see any object in it: hence Government suffers, as in the elaborate and artificial system which is now enforced any blunder is fatal. In other districts I have striven to educate and bring forward some few promising subjects, but it has the appearance, if not the reality, of favouritism; and a remark of the late Lieutenant-Governor made a great impression on me, "That it was more important to raise the standard of "the whole class, than to elevate a few individuals above "their contemporaries." This determined me this year to try the experiment of teaching the whole body of Sudder and Mofussil employées, and test their capacity by examination.

4.—As a preliminary measure, during my last tour last year, I spoke separately and alone to every employée, asking casual questions and informing them distinctly of what I intended to do. I also served out a copy of the cheap translation in the vernacular of the "Directions to Collectors and Settlement Officers" to every man. To the excellence and faithfulness of this translation I bear willing testimony, having now had ample opportunities of testing its merits: the cost was only Re. 1-5-0, which was less than a burkundaz would pay for his sword. To facilitate the teachers and pupils, the Catechism in Urdu was prepared also, and, with the sanction of the late Lieutenant-Governor, published.

5.—To the tehseeldars, nine in number, I spoke seriously, exhorting them to read themselves and form classes in their tehseels for the instruction of their amlah. Some turned entirely a deaf ear; others have gallantly assisted me. I was prepared for opposition, and the principle of passive resistance. Notwithstanding repeated reminders during the months of April, May, and June, I was informed that in some tehseels no progress was being made; on the other hand, the whole of the Sudder amlah were nearly

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ready for examination: and in the town of Banda two or three of the best informed had opened schools, where every evening instruction was given, and a large body of candidates for public employ (with the additional spur of hunger) qualified themselves, begging to be examined before it came to their turn.

6.—On the 1st of July the class of canoongoes assembled, ten in number, to whom were added some of the Sudder amlah. The Tehseeldar of Banda, assisted by a naib of another pergunnah, assembled them for a morning and evening lecture: they were many, more or less prepared. They went through the whole of the "Directions to Collectors and Settlement Officers" in the lecture, question by question, and after fifteen days they were ready for examination.

7.—In the same way the class of gomashtashs was presided over by another tehseeldar and another naib; the class of wasil-bakee nuvees, siaha nuvees, araiz nuvees; and in short during the three months each class came into Banda to be instructed and examined. Some men came quite ready; others soon picked up what was required. The Sudder amlah were formed into classes also, and candidates for employ joined themselves to whichever party best suited them. An interest was soon excited; the thing began to be talked about; members of the Judge's establishment and of the other Civil Courts, of the Magistrate's office, and sons of vakeels, volunteered to be examined.

8.—Whenever a class was ready, I was informed: the number of a class to be examined was never to exceed nine; the hour of examination was 7 P. M., in my private house. When the class had seated themselves on the carpet before me, without any books, the book of questions was opened by myself, and beginning from the first to the last, the number of the question was indicated by myself, and the question slowly read out by one of the tehseeldars

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present. An hour or more was occupied, and about seven questions at random to be answered *vivâ voce,* fell upon each party: and wonderful accuracy and felicity of expression were shown by many. There could be no tricks or favouritism; and even suppose that some were crammed for the occasion, it is a step gained, for if as I propose the examination be annual, the matter crammed this year will be digested by next year, as it relates to the daily work in which they are employed all the year round. Those who were rejected (which did not often happen) had to come up again with another class. Many nights were occupied in examining 143 men: frequently the assistant collectors and deputy collectors sat by, following the questions; and to the rear there was always in attendance a large body of "passed men," or men "nearly ready," and the interest taken by them in the progress of the examination, the murmer of dissatisfaction at some blundering answer, showed *that a spirit of emulation had been roused.*

9.—Parties whose salaries exceeded 15 Rs. were obliged to pass examination in both the Directions to Collectors and Settlement Officers. Parties below 15 Rs. were obliged to pass in the former, and informed that their chance of promotion depended on passing in the latter. Certificates in English and Urdu were then issued, of complete, good, or fair knowledge of the subject; and I have rigidly kept to the rule of neither promoting nor appointing any party to a permanent or temporary vacancy who has not given me this guarantee of his fitness, or made this exertion to qualify himself. No exceptions were made in favor of any: the naib tehseeldars were themselves examined. The tehseeldars, being also deputy magistrates, I left to the Government, as their fitness should be tested by some such test as is applied to moonsiffs. Two old siaha nuvees broke down terribly, and being past the age of sixty they despaired of learning, and were

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allowed one year more, after which they must retire from the service. Some four or five have had an additional period of grace allowed them, which will expire on the 1st of November.

10.—I think that I have shown that the scheme is feasible. The test cannot be over-exacting, when so many can reach it and so very few fail ; and yet that test comprehends the whole range of Revenue law and practice that falls within the notice of native employées. My further proposal is that this school should be opened every year during the rains—at which season there is a dead lull of work, even in this heavy district—and that appointments and promotion should be so far guided by it that none be allowed to retain or accept office without a certificate of proficiency. The whole body of amlah should be classed in three grades:—

I.—Naib tehseeldars, serishtadars, and naib serishtadars.

II.—Employées whose salary exceeds 15 Rupees per mensem.

III.—Ditto whose salary falls short of that sum.

The collector's character-book—which should be *faithfully kept up* and handed from one incumbent to his successor—would show each man's character, his good and bad conduct; his certificate, endorsed annually by the Examining Committee, would speak to his qualifications. There would then be fair grounds for the interference of the Commissioner if parties were suddenly dismissed *for newly-discovered incompetence*,—if new men, with influential connection, were promoted "per saltum" to the 2nd or 1st grade,—if a train of men followed the Collector from one district to another. When merit and demerit are certified in each district on an established principle, there will be no occasion for this last objectionable practice, which is only defended by the plea of ignorance of the qualification of the district employées.

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11.—Then again, a school of apprentices might be formed in each cutcherry. I have always practiced this, and found advantage. Young, promising men apply for leave to work in the office, and are consigned as "helps" to some mohurrir; their merits are soon well known, and they are ready for acting appointments or permanent posts. There is a cry against the general dishonesty of native amlah.—Have Government ever done anything to improve their position? Without running into the opposite extreme of forming a privileged service, surely something can be done to shut the door on unfit nomination, to weed out certified incapables, and to promote merit. The best way to secure good service is to encourage noble emulation; to allow talent, energy, and good conduct an opportunity of displaying itself; to furnish each person with vouchers of past conduct, to stand him in need in the day of trouble. We must feel it ourselves, with all the strength of a superior social position and guaranteed rights; the approbation of the superior authority is grateful; and the disgust at being postponed, to inefficient favourites, is intense. Men are men all over the world.

12.—Were a list of the names of all native employées receiving a salary of 10 Rs. or more published annually in the vernacular, great advantages would be derived. No one would like to have his name expunged from this "golden book." On the last page might be entered the names of those who are debarred from future employ. It is painful now to hear that a man lately dismissed from one district for notorious misconduct is going to be employed by another collector—*the very possibility is offensive*, and strikes deep at the morality of the whole service. The admirable treatise, the "Directions to Collectors of Land Revenue," has done much both for European and native employées; but we still require more familiar expositions of the subject, or particular parts of it, to enable each man to possess useful books of reference: and a Revenue

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magazine, published periodically, noting curious cases and hard knotty points of Revenue law, peculiar tenures, &c., would be of the greatest use; and native contributors to its columns would, I imagine, not be wanting

13.—Another point should not be overlooked. In former days the tehseeldar was only a collector of cash, and merely a ministerial officer, obeying orders issued; but, as our system has gradually developed itself, especially since 1840, a great part of the business originally transacted in the collector's office is done in the tehseels, to the great relief of the people; and the tehseeldar is in effect registrar of property, summary judge, manager of putwarees, and applyer of coercive processes; and his amlah discharge the duties formerly discharged in the Sudder, many of which are of a judicial character; all require system and care, and a degree of acquirements very superior to that of the mere copyist. Yet no measures have been taken to instruct these amlah, or to hold out to them the advantage and opportunity of instructing themselves: in vain the Government and the Board issue circular after circular. I can speak for my district, that to within the last two years they were *neither read, marked, nor understood*; the grossest ignorance prevailed throughout; nobody knew and nobody cared; the most established principles were matters of doubt and open questions; the tehseeldars could not distinguish "a transfer" from "a farm," or "a puttee" from "a mehal," whence the most cruel, blunders arose: nor could they enumerate the cases which could be heard in the Summary Court. Can we wonder, when the elaborate and truly admirable system had so far outstripped the capacity and knowledge of the workmen, that the results were the wildest irregularities?

14.—Some authoritative check is required on nepotism. Deputy collectors and tehseeldars have often to expose frauds and correct errors; how can they do so when their own brothers, sons, or wives' relations, will perish in the

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move? They cannot be *expected to be more than men*, and should not be exposed to the temptation. Anyone who knows the timid character of the natives will be prepared for the constant excuse that they were unable to control their subordinates, on account of their connection with those in power, who would do them a bad turn. More than one officer has made this excuse to me. In the same way it is highly prejudicial to the interests of Government to allow the same cluster of men to settle down for indefinite periods in one nook. Local customs, local partialities, connections, and interests, spring up, and good men break down or go wrong. Change every five years from pergunnah to pergunnah is desirable; every ten years it is absolutely necessary.

15.—The annual School of Instruction causes the assembly of all employées once a year at the Sudder station; changes can then be made, and the painful duty discharged of weeding out veterans. Men must not be allowed to do their duty by deputy; where pension is allowed it should be granted, and where it is not the interests of the State still require that a person not able to discharge the duties should be removed. But the practice of making appointments hereditary, as I found too much the case in this district, is strongly to be deprecated, as the parent of the grossest abuses.

16.—I trust that I may be pardoned for this intrusion: so much has been written on the advantages of instructions of putwarees, that it occurred to me that unless we instruct the amlah, who will teach the putwarees? Although the majority of the amlah are Hindoos, few know Hindee; still fewer know the principles of measurement, and still fewer are decent accountants: all these things may be taught, and will be learnt gladly *if promotion is the result.* I believe that this is a new field of reform, but the subject is one deserving of notice. I have already

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extended the principle to my judicial establishments: the sudder amlah of the Magistrate's office are now under preparation for examination, which will come off this month; and during my tour the police thannadars, naibs, and mohurrirs have been informed that they will be examined. A book of questions on judicial routine, and the subjects treated of in the "Darogah's Manual," has been prepared and circulated, and is ready for the press, if required. Several of the clerks of my English office have also come forward to be examined in the "Directions."

17.—For the success of my examination I am mainly indebted to Lala Hurgobind, Tehseeldar of Banda, a pupil of Deputy Collector Rae Ramsurun Doss, sent to me by the Collector of Dehli at your requisition last year. During the months of April, May, and June, his house every evening became a large class-room, as all resorted to him to be taught or to have hard points resolved. Many men are indebted to him for their promotion: for, knowing every detail accurately himself, he is delighted to instruct others and ground his pupils in Revenue law. He has shewn the greatest interest in the whole matter; has spared no personal exertion; and I gratefully acknowledge his services.

Letter from W. MUIR, ESQ., *Secretary to Government, North-Western Provinces, to* G. J. CHRISTIAN, ESQ., *Secretary to the Sudder Board of Revenue, North-Western Provinces, No.* 4417.—*Dated* 10*th November*, 1854.

I AM desired by the Hon'ble the Lieutenant-Governor to transmit for the information of the Board the accompanying copy of a letter from the Collector of Banda, dated the 20th ultimo, No. 663B., with enclosure, reporting on a system of instruction instituted by him for his native amlah, and offering remarks on the subject of patronage on the native establishments.

2.—His Honor desires me to inform the Board that this report will be published for general information in an early

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number of the "Selections from the Records of Government."

3.—The Lieutenant-Governor will be happy to receive from the Board any remarks which may occur to them on the best means of ensuring needful qualifications and of guarding against serious abuses, his sense of the importance of which objects has led Mr. Cust to devote the intelligence and labour by which the success of these examinations in his own district has been so creditably secured. The plan may not perhaps be one to be authoritatively prescribed; but the aim of effecting a pure and well-directed course of selection in the appointment of parties to the very many ministerial offices of influence and usefulness on the district establishments is one to which the best efforts of the Government and of all authorities concerned ought unceasingly to be given. And it will be desirable that the Board should, on the article appearing in the "Selections," call the attention of their subordinates to the subject—so as, it may be hoped, to lead to a general desire, as far as local and other circumstances may permit, to imitate Mr. Cust's excellent example, and to arouse a spirit of honorable industry and emulation among the candidates for public employment.

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No. 3.

REPORT ON EDUCATIONAL BOOKS IN THE VERNACULAR.

I.—MEMORANDUM *No.* 19*A.*—*General Department, North-Western Provinces.*—*Camp Etmadpore, the 6th January,* 1854.

W. Muir, *President*, G. J. Christian, H. S. Reid, C. P. Carmichael, *Secretary.* } *Esqrs.*

THE Honorable the Lieutenant-Governor has been pleased to appoint the officers noted in the margin to be a Committee for examining and reporting upon all works known to have been compiled in these Provinces for the communication of European knowledge and science through the medium of the Persian and Vernacular languages which are above the range of the class-books used in the village and tehseelee schools, and were designed for use or may be probably capable of adaptation in the higher educational institutions supported by the Government.

2.—The Committee will commence its operations at once by examining and reporting upon the works of the Dehli Translation Society, or any others which may be immediately at hand; and they will correspond with the several colleges, in order to obtain a complete set of works to which their investigations may be extended.

3.—Mr. W. Muir will be the President, and Mr. C. P. Carmichael the Secretary, of the Committee.

II.—*From the Committee appointed to report on Vernacular Books suited to the Educational Institutions of Government, to* W. MUIR, ESQ., *Secretary to Government, North-Western Provinces.—Dated Agra, the 19th March,* 1855.

From Mr. Carmichael to your address, dated 1st February, 1854.
To Ditto, No. 388, dated 11th idem.

WITH reference to the orders of the Hon'ble the Lieutenant-Governor, contained in your Office Memorandum No. 19A., dated the 6th January, 1854, and the correspondence noted in the margin, we have now the honor to report as follows:—

2.—The instructions contained in the above memorandum call for a report upon such vernacular treatises in general as are fitted for the higher educational institutions of the Government; but the Committee are directed to commence their operations by examining and reporting upon the publications of the Dehli Translation Society.

3.—Our official avocations have afforded us the leisure to peruse but a small proportion comparatively of the works of the Dehli Society, and the opinions expressed must be received with this caution: at the same time it may be added that we have no reason to believe a more extended examination would lead to any material modification of our views. The works were taken up at random, and may reasonably be presumed fair specimens of the translations of the Society.

4.—Copies of the notes and memoranda recorded by the several members of the Committee are herewith forwarded for submission to His Honor, according to the list given in the margin.

1.—Note by Mr. Muir on a translation of the Life of Cicero, by Pundit Motee Lall, Senior Scholar, Dehli College.
2.—Note by Mr. Muir on the History of Mahomedanism.
3.—Note by Mr. Christian on a translation of the Life of Alexander.
4.—Note by Mr. H. S. Reid on the Dehli Society's vernacular publications generally.
5.—Memorandum by Mr. H. S. Reid on a translation of the History of Greece, and Illustrations of Natural Philosophy, issued from the Dehli College.
6.—Note by Mr. Carmichael on certain of the Dehli publications.

5.—The Committee have also received lists of vernacular school-books, with notes of their character, from the Principals of the Benares, Agra, Bareilly, and Dehli Colleges. These are enclosed in original†. Especial attention is requested to the papers given by Dr. Ballantyne and Mr. Tregear. It will be observed that many of the translations are praised by the former, while the opinion of the latter is strongly unfavorable to all that have come under his notice.

†Report of the Principal of the Bareilly College on Vernacular School-books.
List from Principal of the Benares College.
Ditto from Principal of the Agra College.
General List of Vernacular School-books, by the Principal of the Dehli College.
Report by Curator of Government Books.
Note to Assistant Secretary, by Mr. Wollaston.

6.—Although the Committee are unanimous in their views as to the general unsuitability of the Dehli publications in their present form for educational purposes, they do not entirely agree as to the possibility of turning them to use in a revised or modified shape.

7.—In the opinion of Messrs. Muir and Reid, many of the treatises are quite unfitted, both as regards their contents and the style in which the translation is executed, for native comprehension; and the labor of re-casting

them in a suitable form, even if that were practicable, would probably much exceed that required for a new work. Literal and unidiomatic renderings; passing and undeveloped references to foreign habits and customs, or to facts unknown to the mass of native readers; and unintelligible passages occasioned by the absence of any successful attempt to conform the ideas to the native modes of thought, render such treatises absolutely useless.

8.—There are others, however, which in *their* opinion are capable of being turned to account. Great pains have been taken in their translation, and some attempt made at adapting them to the natives of the country. Of this nature, Messrs. Muir and Reid would specify the "Principles of Legislation from Bentham and Dumont, by F. Boutros, Principal, Delhi College, translated by Pundit Ram Kishen."* Some passages of this work, such as those on the Theory of Punishments and Principles of Evidence, might with perhaps a little alteration be extracted and published in a separate form, as useful school or college manuals. They would also mention as coming under this description Fenelon's "Thoughts on the Existence of a Deity," translated by Pundit Ram Kishen; "Jugrafya-i-Hind," by Pundits Saroop Narayan and Shewa Narayan; "Autobiography of Timur," if judiciously abridged; Pundit Ram Chundra's Vernacular Reader, the "Ajaibat-i-rozgar." Messrs. Muir and Reid would recommend that some competent native translator (as Suddasookh Lall) should be encouraged to go over the whole series, and under Mr. Reid's directions to prepare a report upon the expediency of re-publishing either whole treatises of the above description or suitable extracts, with such modifications as may render them intelligible and useful as text-books for schools or colleges.

* Mr. Muir's memorandum on this work has been mislaid during its circulation among the other members of the Committee.

9.—The views of Mr. Christian have been already given in his note, dated 16th November last, which will be found among the enclosures. So far as he can judge from the recorded opinions of others and from a cursory perusal of some of the translations, he considers that they are generally unsuited to this country. The works have been ill-selected and the translations badly executed. But few of the works are of a kind likely to be practically useful or popular; and such as are could only be adapted at the cost and labor of re-translation.

10.—Mr. Carmichael concurs generally in the views entertained by Messrs. Muir and Reid.

11.—We regret that our report should have been confined almost entirely to the publications of the Delhi Society. But we understand that it was chiefly with the view of obtaining an opinion upon those publications that His Honor was pleased to form the Committee.

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III.—NOTE *by* W. MUIR, ESQ., *on the* LIFE OF CICERO *(Delhi Society's Publications) translated from Plutarch's Lives by* PUNDIT MOTEE LALL, *Senior Scholar, Delhi College.—Dated Nynee Tal, the 12th May,* 1854.

I HAVE read through this work with some care.

It professes to be a "translation," and as such is probably a very fair production, though, without the English version of Plutarch's work from which it was made, one cannot say whether it is strictly accurate or not. Upon the whole, judging from the context, it appears to be creditable.

It is not, however, as a mere translation that the work must be tried, but as a compilation suited by itself, and without explanatory helps attainable by few, to the native comprehension, and particularly to the capacities of those who frequent our educational institutions.

In this view my opinion of the work is entirely unfavourable.

In the first place it contains in every page abundant allusions to Roman society, customs, and manners, which must be totally unintelligible to a native. Plutarch's Lives are written for Europeans, and the readers of the translations in European languages are familiar with the state of things described. Much knowledge is therefore pre-supposed, and allusions are made and facts referred to without the necessity of explanation. But in a treatise for the people of this country, to take for granted such knowledge is to render the work unintelligible. And this is the chief fault I find with the present production. Consuls, Tribunes, Questors, Praetors, Dictators, the Senate, Knights, Patricians, the Republic, Censors, Aedils, Philippics, a Sphinx, names of Deities, &c., are referred to, some of them constantly, and in a manner that must be totally incomprehensible to the reader. True, occasional explanations are given in notes, but they are cursory and seldom accompany the first notice of the subject or name. Indeed, they are so little adapted in general to the enlightenment of the native mind or the accurate representation of the idea intended, that I suspect most of them to be the mere transfer of notes in some English translation of Plutarch, and therefore quite inadequate to the object required in a vernacular treatise.

So the proceedings in the Senate, the speeches and *bon mots* of Cicero, incidents in domestic and political life, &c., are all related in a manner which would need very extensive supplementary details and preface to render them intelligible. With some knowledge of the events, it was occasionally quite impossible for myself to make out the point of the story, or understand what was intended.

The same remark applies to the whole course of the stirring political incidents with which the life of Cicero is so closely interlaced. The sedition of Cataline, the rise of Julius Cæsar, his struggle with Pompey, the conspiracy of Brutus, the fortunes of Octavius, and all the other great events of the day are referred to and treated as already known; whereas in the present ignorance by the natives of this country of classical history, a vernacular work should develope every idea into a form intelligi-

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ble in itself and not requiring for its comprehension an extensive knowledge of history. Even for a much more advanced state of knowledge, the minute and constant allusions to facts in Roman History would be entirely inappropriate. Such notices should be as few, as simple, and as complete in themselves as possible. And this could not be done without the entire re-casting of Plutarch's story, which was meant for a completely different class of readers.

There is one other point which, though of minor importance because it could be easily rectified, is yet very prejudicial to the book in its present form. I mean the orthography of the names, which are written in detached syllables. Many of the names I cannot make out: the following will be deciphered with some difficulty, even by a classical scholar:—

ٹرای ام ور یٹ	ایٹ رو ری آ
ڈی موس تھی نیز	کوان ٹس ای پی ری اس
سسی لی شی ا	کو ری لی یا اس لن ٹلس
کپی ڈو شی آ	ٹری بیو ن
اپی ری ٹی او نا مہ ری بز	او کٹ سے وی اس

In fact, it is extremely difficult sometimes to tell where the name ends and the common words of the sentence again begin; for most of the names, from the strange manner in which they are cut up, look like a combination of particles, pronouns, &c.

A prodigious number of names have also been introduced without due necessity, tending with the monosyllabic orthography to bewilder the reader. In such a work, intended for this country, there ought to be no names introduced not directly and necessarily connected with the story.

In fine, the great cause of the disqualification of this treatise is that it is a mere translation, not modified or adapted in any way to the ideas and present knowledge of the people of India; and all such servile translations, excepting in subjects belonging to the exact sciences, must prove unsuitable not only for our educational institutions, but for perusal by any class of native society except by those who, from being already well acquainted with English, do not stand in need of them.

I dare say Suddasookh Lall, under Mr. Reid's supervision, could make something out of this book, but with a great deal of pruning, alteration, and explanatory addition.

IV.—NOTE *by* W. MUIR, ESQ., *on the* HISTORY OF MAHOMEDANISM.—*Dated Nynee Tal, the* 18*th August*, 1854.

I took up the "History of Mahomedanism" with the hope of finding that, as the subject was itself an Oriental one, it would be free from the

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faults of want of adaptation which I found in the "Life of Cicero."

I have read about a dozen pages at the beginning, and looked cursorily at the opening of the 4th, 5th, and 6th chapters.

The first three chapters, to the decline of the Caliphate, are translated by Moonshee Noor Mahommud—it is not said from what work. (Taylor's Mahomedanism ?)

I regret to find in the specimens I have read the same defects, though in a less degree, as in the Life of Cicero. The work is one composed for Europeans, and even though on Oriental history, it cannot be translated without some modification, to any good purpose. See, for example, the references to European history, at page 4.

But there are worse defects than these. I have read in the 1st chapter as far as the Hegira, and find even in that short period numbers of confused, unintelligible, and positively erroneous statements. Some of these I have marked in the margin. They are the more fatal to the work because any Mussulman versed in his own literature will immediately detect them, and discredit cannot fail thus to attach to the whole work, if not in some degree to our translations generally.

The 4th and 7th chapters, embracing the subsequent history of Islam, have been translated by Pundit Ramkishen. I conclude that they contain much valuable information regarding the Tartar Dynasties, and that it must be generally accurate; but the translation is bad and unidiomatic, as is attested by Moulvie Fyz Ahmed, a few of whose marginal corrections will be found in pencil.

The 5th and 6th chapters have been translated by Petumber. The translation seems tolerable; yet even here there is carelessness or ignorance, صورت being repeatedly written for سورة—see page 198. But the subject (the Koran and Moslem rites) of the fifth chapter, and the freedom with which it is treated, must render the work intolerable to a Mussulman; and both it and the sixth chapter (literature and science among Mussulmans) have the same fault as the first (and in a stronger degree), viz., that they are a bare transfer of European ideas into an Urdu dress, without attempt at adaptation.

While such freedom is used with the Mussulman dogmas, the style of Mahomedan usage is preserved in speaking of the Prophet.

The صم, and frequently the full صلى الله عليه (the invocation of blessing upon Mahomet), are attached to his name, and even the pious application of مصطفى (the Elect, or Chosen).

Though willing, from consideration to the *Mussulmans themselves*, to speak respectfully of their Prophet, I do not approve of the introduction of phrases recognizing the truth of his mission; and they should be avoided in all publications patronized by the Government.

Upon the whole, I cannot say that this treatise, from the partial review at least which I have been able to take, is at all fitted for our educational

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institutions; though I doubt not that it contains a fund of valuable material, which, eliminated from that which is inappropriate, might in the hands of some of Mr. H. S. Reid's employées be formed into a useful work.

The Life of Mahomet himself, and the consideration of the Koran and tenets of Islam, are very delicate subjects for this country; and it appears to me that the period from which free historical narrative in treatises intended for the Educational Institutions of the Government can commence is not until the close of the Prophet's life. Indeed, until the accession of the Abbassides, 136 A. H., it is difficult to express any opinion on the character of the Caliphs without offending the anti-Omeyud prejudices of the Mussulman world.

V.—NOTE *by* G. J. CHRISTIAN, ESQ.—*Agra, the* 16*th November*, 1854.

HEREWITH I return all the papers which have reached me connected with the works published by the Translation Society.

The only work which I have had leisure to look at is the Life of Alexander, translated from Plutarch. The observations made by Mr. Muir on the Life of Cicero, also translated from Plutarch, apply equally in this case. The book must be utterly unintelligible to every native who is not also something of a classical scholar and familiar with Greek politics, manners, customs, mythology, and ancient geography. No advantage is gained by Urdu versions of such books, for I cannot agree with Mr. Muir that any adaptation can make them useful for educational purposes in India. The style of this translation is at once slovenly and ambitious.

On the general questions of Urdu translations and Urdu literature, I agree with nearly all that Mr. Tregear has advanced in his letter, dated 23rd September, 1854. For educational purposes, as distinct from general literature, Urdu should be used as the means of conveying rudimentary and practical instruction to the masses in the ordinary branches of education. But for subjects more abstruse and for the higher walks of every subject, English, and English only, should be employed.

But if it is deemed necessary to teach chemistry, science, geology, botany, &c., &c., to the masses, who can only be reached through the vernacular languages, one such language should be selected, and Urdu has the greatest capabilities. But whatever language be chosen, no attempt should I think be made to form an elaborate system of vernacular scientific nomenclature, but the English terms in general use should be adopted. They will be just as intelligible to those for whom the treatises are intended as Sanskrit compounds or Arabic derivatives; and the higher and better educated classes will already have become familiar with these terms in their English studies. One great point will be gained if the Europeans and the educated natives thus learn to use a common alphabet of science, which is not altogether unknown to the numbers, who must always remain at best but partially instructed.

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These remarks apply chiefly to educational works; but with respect to general literature the foundations of a healthy useful Urdu literature have yet to be laid, and it is very questionable if translations from a foreign tongue can ever form a good foundation. The difficulty of adapting the literature of the West so as to render translations intelligible and acceptable to the native mind is almost insuperable. The general run of works which are popular in England can only be adapted to the partially educated native mind by being re-written and re-cast. Take for instance "Sandford and Merton," "Harry and Lucy," "The Winter's Evenings," "The Evenings at Home." One of the chief merits in these lies in happy illustrations drawn from objects and customs familiar enough in England, but utterly unknown, or known only to be misunderstood, out here.

In making contributions to Urdu literature by translations from English, those works should be selected which are universal, not local, and which speak to all times and to all peoples. Such works as "Robinson Crusoe," "The History of the Plague," "The Pilgrim's Progress" (if the religious character of it be not an objection), "Gulliver's Travels" (duly expurgated), and "Rasselas," may be taken.

To these and others like them should I think be added numerous works connected with India, its history, productions, resources, geography, &c., &c.; and every effort should be made to induce educated native gentlemen to write original works on their own country and countrymen. The volume of travels recently published by Ameechund under the auspices of Mr. Cust is of this kind, and is a valuable addition to Urdu literature. The natives can only be reached through their own countrymen, and works of indigenous growth, even if they contain some errors and prejudices, will circulate far more widely, and on the whole do more good, than any translations from foreign tongues.

VI.—Note *by* H. S. Reid, Esq., *Agra, the 18th May*, 1855.

I.—*Fenelon's "Thoughts on the Existence of a Deity,"*—translated from the French by E. Ravenshaw, Esq., Civil Service, and into Oordoo by Pundit Ram Krishn. The first part, treating on "Ideas," "The Soul," "The Connection between Body and Soul," is somewhat obscure. The difficulty of the subject is not always overcome by the translator; the sentences are often involved, and the sense of many passages are beyond the comprehension of the ordinary run of native students. The second part, on the Bodily Constitution of Man, and the proofs of a Creating Deity therein exhibited, is excellent. The book is worthy of a thorough and careful revision.

II.—*The Travels in Europe of Yoosuf Khan, Kumulposh.*—This book is almost as much a burlesque as "Hajji Baba in England." The writer, truly no orthodox Mussulman, describes with tedious minuteness all trifling incidents; while subjects of importance are very summarily noticed. Choice comestibles excite his special and frequent admiration, the magnificence of English hotels his enthusiastically expressed wonder, which

reaches its climax on his entering the "Bal Moot Serae" (The Bull and Mouth!), when he exclaims "Am I in the palace of the King of London, or in fairyland!" He looks on with great delight at the artistic representation (at Astley's Theatre) of the hair-breadth escapes of Muzaffar Kazilbash (*vulgo* Mazeppa), and recounts the scene most circumstantially; while the wonders of science and art are dismissed with but scant notices, as "tulismat ka mukan!" The book should be rejected.

III.—*The Geography of India* (extracted from Murray's Encyclopædia of Geography),—translated into Oordoo by Pundits Suroop Narayan and Sheo Narayan, of the Dehli College.

An useful work, written in correct and plain Oordoo. Though not so good a geographical manual as Pundit Bapu Deva's compilation, it contains much information which the latter does not give. It might be advantageously re-published, after revision.

IV.—*Biography of Eminent Men*, by Ram Chundra, Teacher of European Science at the Dehli College.

The style of composition is at times faulty, so much so as to render passages almost unintelligible. This defect lessens the value of an otherwise excellent work. Mouluvee Kumr-ood-deen, if he would undertake the revision, might remedy this fault.

V.—*History of England*,—translated from Pinnock's History, by Hakeem Jawahir Lall.

This book is written in simple and easy Hindee, but abounds in mistakes. In the first page we are told that Julius Cæsar was the first *Raja* of Rome, the Hindee term being of course applicable to Romulus and Numa, equally with Julius and Augustus. Grammatical inflections are often disregarded; *ex. gr.* "Pahila Charles ká," as though "Pahila Charles" were one compound word. English names which happen to be identical with some Hindee word are not given with sufficient specification—for instance, "Jan," in place of "Jan Raja" (King John). But a great mistake was committed at the outset in the selection of Pinnock's work, which is both lengthy and wanting in methodical arrangement. The Hindee version contains no less than 780 pages. The bulk, and consequent high price, deter purchasers. Besides, for the vernacular departments of our schools and colleges we require a work which gives broad and marked outlines, and treats less of individual reigns than of dynasties and epochs—noting important revolutions and their consequences, and tracing the progress of constitutional freedom, knowledge, and civilization. Nothing can be made of this treatise.

VI.—*History of the Mogul Emperors* (extracted from the "Edinburgh Cabinet Library," History of British India),—translated by Moonshees Hoossainee and Noor Moohummud.

An useful work, and written in good Oordoo. It occupies much the same ground as Hakeem Jawahir Lall's "Mukhzun-ool-Tawareekh," an

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abridged edition of which is now in course of preparation. We may, I think, decide that it is superseded by the latter publication.

VII.—*Directions to Settlement Officers*,—translated into Oordoo by Rae Ram Surun Das, Deputy Collector of Dehli.

The late cheap reprint of Mr. W. Muir's valuable Oordoo version of the "Directions" renders it unnecessary to take up this work.

VIII.—*Practical Land Surveying by the Theodolite*,—translated into Oordoo by Hurdeo Singh.

This work is superseded by the Roorkee treatise.

IX.—*Treatise on the use of the Sector*,—compiled by Suyyud Uhmud Khan.

Captain Oldfield pronounces the Suyyud's treatise to be "more curious than useful—the instrument itself being but little used, and not in the hands of the people of India."

X.—*The first Eight Chapters from Herschel's Astronomy, twelfth Chapter from Bonnycastle's Astronomy, and the Supplement from the Encyclopædia Britannica, &c., &c.*,—translated by Pundits Ajodhiya Pershad and Ram Chundra.

The first eight chapters are written in good, the last three in tolerable, Oordoo. The text is very much vitiated by the introduction of English technical terms where Oordoo equivalents are available—*ex. gr.*, "parallax" in place of "ikhtifafool-munzoor," "umbra" for "sayuh kusee," and "penumbra" for "sayuh khufeef." It is scarcely suited for an elementary treatise, the student's acquaintance with mechanics, plane and spherical trigonometry, &c., &c., being pre-supposed. As a popular treatise it must give way to the Hindee and Oordoo versions of Tomlinson's "Recreations in Astronomy," which are preparing for the press.

XI.—*Khoolasuh-i-Quwaneen Foujdaree*,—by Moonshee Hoossainee.

This is an Oordoo translation of Skipwith's "Assistant Magistrate's Guide," far too literal, and therefore exceedingly unidiomatic; badly arranged; no heading for the particular crime or subject-matter. The English treatise arranges the subjects in the order of the English alphabet. The translator servilely follows the original: consequently the Oordoo version exhibits great confusion.

XII.—*Marshman's Guide to the Civil Law*,—translated by the Professors of the Dehli College.

The Oordoo text is clearly worded, though at times too close to the English original. The work is too large and expensive for general use.

Paley's Natural Theology,—translated into Oordoo by Mouluvee Kumal-ood-deen Haidur, under the superintendence of Colonel Wilcox.

The style is obscure and unintelligible. We have two or three excellent little treatises on the same subject. For instance, Pundit Debi Pershad's "Moozhur-i-koodrut, " the " Khiyalat us Sanaya, " and " Khiyalat-i-sanaya" (Oordoo and Persian versions of Selections from Sturm's Reflections).

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XIII.—*History of Kashmir*,—by Moonshee Ushruf Ali.

Written in good Oordoo, but the authenticity of the narrative questionable. The value of the work as a historical manual hardly justifies the trouble and expense of re-publication.

XIV.—*Taimur's Autobiography*,—translated into Oordoo by Mouluvee Soobhan Bukhsh.

An abridgment of this work might be prepared. The style of composition is excellent, and much interesting matter is presented to the reader.

XV.—*Shumsher Khanee*.—Abridgment of the Shahnamah, translated from Persian into Oordoo by Moonshee Mool Chund. (This is not one of the Dehli Vernacular Translation Society's publications.)

Considerable pruning might make this a good standard class-book for Oordoo verse. It is elegantly written, excepting where style is sacrificed to rhythm. I have made over the work to Moonshee Buldeo Bukhsh, Zilluh Visitor of Agra, with the request that he will see how far the fabulous parts can be omitted without impairing the interest of the story.

XVI.—*Compendious Grammar of the Oordoo Language*,—by Mouluvee Uhmud.

Too much of a compendium; obscure in its brevity. It is inferior as a manual of grammar to Mouluvee Kureem-ood-deen's "Kuwaid-ool-moobtudee," which is read in Tahsili schools.

XVII.—*History of Rome*: an Oordoo translation of Dr. Pinnock's work, by Moonshee Sheopershad.

This work is open to many of the objections brought by Mr. Muir against the Oordoo "Life of Cicero." The orthography of proper names is wonderfully perplexing. The Oordoo style is inelegant, and the book too bulky and expensive for school use. We require more of an outline sketch of Roman history.

XVIII.—*Insha-i-Madho Ram*,—translated into Oordoo by Moonshee Suyyud Moohummud.

A servile and literal Oordoo rendering of the Persian original. As a school-book it is useless.

XIX.—*Moohib-i-Hind*,—edited by Ram Chundra, of the Dehli College.

This serial often contains excellent articles. Those on vernacular education are remarkably good. I am not aware if it is still kept up—if so, it should be encouraged.

XX.—*Selections from Hindustani Poets*,—by Moonshee Imam Bukhsh.

The selections are chiefly love-songs. Persian words and phrases abound. The book is entirely unsuited for any good purpose.

XXI.—*An Elementary Grammar of the English Language*.

An excellent little publication, but superseded by Moonshee Soodasukh Lal's "Kaiduh Ungrezee," and "Muftah-ul-Quwa'id."

XXII.—*A Vernacular Reader*,—compiled by Pundit Ram Chundra.

Written in simple and elegant Oordoo; contains much interesting matter; consists of three parts:—I.—Treating in a popular way of natural

phenomena, monuments of architectural skill, and animals exhibiting peculiar physical conformation. II.—Short dissertations on the moral affections—*ex. gr.*, truth, contentment, pride, envy, &c., &c. III.—Brief historical pieces (sketches of the early history of Hindustan, the invasion of Nadir Shah, &c). A new and cheap edition of this work will be most useful.

XXIII.—*Elements of Logic*,—by Moulavee Synd Moohummud.

XXIV.—*A Treatise on Rhetoric*,—by Moulavee Imam Bukhsh.

Suitable class-books for advanced students, but not of sufficiently general use for Government to take up the re-publication.

XXV.—*Mechanics.*—Translation of Young's Mechanics, by Pundit Radha Krishn.

The preceding remarks are applicable to this work also. It is scarcely elementary enough for beginners. The Oordoo version is not always clear—many sentences being involved and Persian words too freely introduced. Vernacular translations of Baker's "Mechanics" (Weale's Series) and Tate's Exercises on Mechanics and Natural Philosophy, in course of preparation, may render the re-publication of this book unnecessary.

XXVI.— *Kitab-i-ilam-mây'dt;*—translation of Webstor's Hydrostatics, by Pundit Ajodhiya Pershad.

A careless translation. English terms are given in the Oordoo characters for which Oordoo equivalents might be coined—*ex. gr.*, "forcing pump," "condenser," &c., &c. "Solid" (as opposed to "fluid") is rendered by "moojussum," in place of "moonjumid;" "*hydrostatics*" by علم مایعات, whereas the word should be written مایات.

XXVII., XXVIII.—*Elements of Geometry.* Books of Euclid—1st, 2nd, 3rd, 4th, 5th, 6th, 11th, and 12th—by Moulavee Mumlook Ulee.

A literal translation from the Persian version, I believe. As far as the first volume, comprising the 1st, 4th, and 6th books is concerned, Moonshee Mohun Lal's edition, which is decidedly superior, renders the re-publication of Mumlook Ulee's version unnecessary.

XXIX.—*The Goolistan*, in Oordoo,—translated by Meer Sher Ulee Ufsos. Below even a poor translation; ungrammatical in construction; abounding in interpolations and omissions.

VII.—MEMORANDUM *by* H. S. REID, ESQ., *Nynee Tal, the 20th October*, 1854.

The History of Greece (translated by Moonshees Wuzeer Ulee and Sheo Pershad, of the Delhi College) is too literal. The translators have adhered too closely to the English text. For instance, "he marched straight," they render by "usne sidha kunch kiya:" again, "tulwar dil men dubona," "nigah se aek zukhm kari paya." Examples could be multiplied. Notwithstanding this grave fault, "the style is plain and easy," as Mr. Carmichael states, and the lithography is the best specimen of Dehli printing I have ever seen. The conversion of proper names into Oordoo

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has not been altogether satisfactorily carried out; the original Greek form should be given—for instance, "*Atheenee*" *is better than Atheens*, &c., &c.

The Illustrations, &c., of Natural Philosophy,—by Pundits Sheo Narayun and Suroop Narayŭn, of the Delhi College, merits Mr. Wollaston's encomia. The translation has been carefully executed, and English technical terms faithfully rendered by Oordoo equivalents, formed from Arabic roots. I met, in a cursory perusal here and there, with only two English terms, "*laes*" and "pump." The explanations are clear and simple.

VIII.—Memorandum *by* S. H. Reid, Esq.

This brief review of some of the Delhi Society's publications establishes in my mind the fact of their failure as far as the generality of the books are concerned. Some few are deserving of revision, such as "Fenelan's Thoughts on the Existence of a Deity," and others which have been favorably noticed.

To create and to form a national literature is a strange and novel task for a Government to undertake. But, under the present peculiar circumstances (literary) of India, such an undertaking does devolve on the British Government, especially with regard to the formation of a scientific and a school literature.

School instruction of any practical value in the way of disciplining the intellect, elevating the tone and standard of morality, and storing the mind of the student with useful knowledge and general information, is afforded only by the colleges and schools maintained by Government or supported by Missionary enterprize.

The education imparted in these institutions is not purely an English one (as far as the *medium* of imparting instruction is concerned). The Oordoo department is scarcely inferior to the English. With equal advantages, the Oordoo scholars distance the English students; but they have to work under very great disadvantages. The laudable and spirited undertaking of the Delhi Society has resulted in failure. The Oordoo scientific and other classbooks are by no means what was *contemplated*, and the Oordoo student is left without the means of home study and unaided self-improvement. The Professor is equally hampered: he must draw his materials from the best English works, adapt his illustrations to the customs of the country, translate from English into Oordoo—necessarily a tedious process—and find but inconsiderable progress, compared at least to the labour expended; such a process can only be effectually carried on when the English Professor is an accomplished Oordoo scholar. In this manner the able Principal of the Bareilly College teaches his senior vernacular classes. The result is satisfactory, but it is obtained only by the expenditure of very great industry and talent.

The Dehli Society's failure holds out a warning against a course of procedure similar to theirs. Because a student has an imperfect acquaintance with English, and can compose in bald Oordoo, he is not necessarily competent to the translation of a scientific work. Neither do the So-

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ciety appear to have selected the English originals (for translation) with the best judgment.

It lies beyond the province of the Committee to enter into a discussion on the best means for effecting that in which the Dehli translators failed.

Before entering on the preparation of scientific treatises, it is necessary to define the principles on which our vernacular scientific terminology must be based. Dr. Ballantyne's views on this important subject appear to me most judicious. Where a cognate language can furnish a scientific nomenclature, it should be resorted to. Oordoo scientific terms may be happily derived from Arabic. In fact, those occurring in the exact sciences have been already formed from that root. The Arabic term need not be a servile rendering of the Greek, where, as in the instance which Mr. Tregear brings forward, such rendering would mislead. At the same time many arguments may be adduced in favor of a terminology common to the nations of the East and of the West.

IX.—NOTE *by* C. P. CARMICHAEL, ESQ., *Assistant Secretary to Government, North-Western Provinces.—Agra, the 4th October*, 1854.

Pinnock's Edition of Goldsmith's History of England.—The most useful part of the translation seems to be the glossary of technicalities prefixed to the work. The rendering, generally, is too literal and confined, and it is therefore often obscure, and sometimes unintelligible. It is evident that the original was not properly understood by the translator—for instance, at page 100, line 18, the phrase "*Goonahgár Cánoon*" is used for "Criminal Law;" and again at page 200 of the second part, "*dewanny tudbeer*," for "foolish acts." These and other similar errors are doubtless attributable to a too servile adherence to the original text, and an attempt to transfer into Oordoo forms of expression which do not belong to that tongue.

The translation is thus rendered stiff and unidiomatic, and not unfrequently obscure and unintelligible. Orthographical errors also are often to be met with in regard to capital names, which, moreover, are not sufficiently distinguished from the ordinary words of a sentence, and thus get blended with them and involve the reader in a labyrinth of difficulties and perplexities.

The large list of errata at the end of the book—which however does not contain a fourth part of the errors that actually exist—is in itself a sufficient proof of the carelessness with which the work has been executed.

History of Greece.—This is a translation by Moonshees Vuzeer Alee and Sheopershaud, of the Dehli College, A. D. 1846. It is in every respect superior to the work above noticed, and much more free from those defects which attach to the other. The style is easy and plain. The names of places and men are correctly spelt, and distinguished from other words by a line above them, and clerical errors are few. The first portion, translated by Vuzeer Alee, is perhaps a little better than the last, done by Sheopershaud; but the difference is small. The printing is clear and legible.

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Arnott's Physics, and Mill's Political Economy.—These two books have been reviewed by Mr. Wollaston, the Head Translator to the Sudder Court. His letter in original I have put up.

Translation of Skipwith's Magistrates' Guide.—As this is a very old translation, going so far back as 1842, it either has been or should be superseded by others of a later date.

Dr. Sprenger on the General Principles of Medicine.—This book Dr. Murray kindly reviewed; he writes me that the language is good, and the explanation of technical terms clear. It is he considers a useful work for students.

Dr. Butter's Translation of Cooper's Surgery.—The language of this translation Dr. Murray pronounces to be indifferent, abounding in difficult Arabic words, and the rendering of the technical terms is obscure; otherwise it is, he says, a valuable and useful work.

Principles of the Mahomedan Criminal Law: a Delhi publication.—This is a good work, and embodies much useful information. It is more adapted however for the use of the higher Criminal Courts than for general circulation.

Guide to the Revenue Regulations,—translated from the Persian by the Moulvees of the Delhi College.—This is the very reverse of what it professes to be: the work would only serve to confuse and mislead a student after Revenue Law. It contains it is true all the Revenue Regulations that have been passed from A. D. 1793 to A. D. 1845, but no note or mention of any that have been cancelled, amended, &c., has been made. The reader would have to find out all this for himself: add to which no Circular Orders or Constructions are given to aid the student in interpreting a difficult point of law or ascertaining how it has been ruled. The idiom, too, is bad, and the translation is far too literal, utterly destroying in many places the meaning of the sentences, and in others rendering it very obscure. Since 1845, also, many new laws have been enacted,—a fact alone to render the revision of this work absolutely necessary, were we even to put aside its present patent defects.

Princep's Abstract of the Civil Law, translated by Moonshee Hoosseinee, of the Delhi College, 1843.—This is necessarily much out of date, being only an abstract of the Civil Law up to 1843, since when the very procedure of our Civil Courts, leaving alone the innumerable laws that have been enacted, has changed. The book in its present state would mislead a judge, not to say a student. It would be a useful work if enlarged and revised.

X.—*From* V. TREGEAR, ESQ., *Secretary, L. C. P. I., Bareilly, to* SECRETARY, TO COMMITTEE ON VERNACULAR WORKS, AGRA.—*Dated Bareilly, 23rd May,* 1854.

1.—In reply to your letter, I have the honor to submit the following remarks:—

2.—I am not acquainted with any vernacular work which is in my opinion wholly suited for a class-book for our students: those original works which are considered models as to language and style are so puerile in

subject and matter, that their perusal is both uninstructive and tedious; while the morality and general conduct inculcated are totally at variance with our own notions on those subjects.

3.—With regard to translations, the most numerous and those I am best qualified to give an opinion on are the publications of the Delhi Vernacular Society. The majority of these are the work of college students, and I am sorry to be obliged to say that the translators appear in general to have been wholly ignorant of the subjects, and very much so of the languages, they were dealing with. I have gone through several of them, and can safely assert that the books would be unintelligible to anyone not previously well acquainted with the subjects. Indeed the system on which the translations were prepared was a bad one. Students, themselves mere learners, were paid from four annas to eight annas per page for translating Herschel's Astronomy, Arnott's Physics, Dumont's Principles of Legislation, and similar works. From the retention of what are misprints in the original, and from the literal and therefore ridiculous renderings of English idioms, it is evident that their attempts were not subjected to revision. There was consequently a very great temptation to haste, and the result has been a number of books exorbitantly priced and utterly useless for their main purpose, viz., the instruction in science of persons unacquainted with English.

4.—The translation of portions of Paley's Natural Theology, printed at Lucknow, is no better than the books above noticed.

5.—Having thus performed the easy duty of fault-finding, I may be expected to state my own views as to the means of supplying original or properly-translated Oordoo works. I have not yet been able to put my ideas on the subject into a form suitable for submission to the Committee; but I hope to be able to do so in a week or ten days at latest; meanwhile I trust that the present letter will be sufficient to enable the Committee to lay their report on existing works before Government.

XI.—*From* V. TREGEAR, ESQ., *Principal of the Bareilly College, to* C. P. CARMICHAEL, ESQ., *Agra.—Dated Bareilly*, 23rd *September*, 1854.

1.—I have now the honour to submit a few remarks on those Oordoo works with which I am sufficiently acquainted to be justified in passing an opinion on them.

2.—*The Introductions to Mechanics, Hydrostatics, &c.,—by the D. W. K. Society.*—These little works were translated many years ago by the students of the Delhi College. The originals are very meagre and the translations are mere schoolboys' work, and no attempt has been made to adapt either the style or the information to the class for whom they were prepared.

3.—In elementary works, it is obviously necessary that the examples and illustrations should be taken from objects and circumstances with which the learner is familiar: pokers, snuffers, grates, and chimneys are articles unknown to our students, and cannot be used as illustrations; they should therefore be replaced by equivalent Indian ones where there are such, or should be omitted altogether. It is not always sufficient to represent an object by the one used here for the same purpose, as there is fre-

quently no other similarity than that of use. English bellows for instance are of a very different construction from Indian ones, and the name would never raise in the mind of a native the idea of a machine acting by means of a valve. The deficiencies here alluded to are of less consequence when the teacher is a European; but to a student who has no aid but that of his countrymen they are serious stumbling-blocks.

4.—I would extend the objection here made to some illustrations generally accepted as fit and satisfactory—to the proof for instance of the sphericity of the earth from the visibility of the masts of a ship when the hull is invisible; this is a fact which has never fallen under the observation of any of our students and of few of our teachers, and is intelligible to them only on the supposition that the earth *is* round. Facts not verifiable by the student should be advanced only in aid of others which are; or where there are none such, to make the teacher's assertion a proof is to encourage that blind trust in authority to which the natives are already too prone, and which must ever be one of the mightiest hindrances to free and independent enquiry.

5.—*Arnott's Physics,—translated by the Delhi Students.*

In addition to the fault of mere verbal translation, this work has that of being frequently unintelligible. Extracts are appended illustrative of this. Some of the minor errors are very ridiculous, but still sufficient to perplex a student: "Engineer" (or engine-man) is translated "Gurh Kuptan;" the cylinder of a steam engine is said to be the "largest portion composed of matter," the original being "the most material part;" a small pipe "turned off" from a large one is said to be "moukoof keea."

6.—*Herschel's Astronomy—by Ramchund, of the Delhi College.*—From the nature of the subject and from the language being more than usually difficult, the errors are naturally more numerous; there are however a great number that must have occurred from sheer neglect. A large list of these is appended, and a larger one might have been made. The sun is put for the moon, and *vice versâ;* convex, for concave; the ecliptic, the equator, and the equinoctial are used almost indiscriminately: the fault of unintelligibleness is very frequent, and in some instances exactly the contrary of the original is given. Extracts will be found in the Appendix.

7.—*Paley's Natural Theology,—translated at Lucknow, by Kumaloodeen.*—A person well acquainted with the original will frequently be able to catch the meaning of passages; but to anyone else the reading of this work would be a profitless task. I need say no more, as I believe the extracts given will show that the book is useless.

8.—*Yoosuf Khan's Travels to and in Europe,—published at Delhi.*—This book has no pretensions to style, and is objectionable chiefly from the great number of absolute untruths it contains, and from the too frequent descriptions of the pleasures of "tea-gardens" and other places of public entertainment.

9.—*History of China,—by Mr. Corcoran.*—The great faults of this book are the overdrawn pictures of the civilization and policy of the Chinese.

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A faithful account of the manners, and customs, and progress of so ancient a nation would be both amusing and instructive ; but here truth and fable are so blended that the book is a dangerous one for a native student. It is now well known that the favourable accounts of the Jesuit missionaries and other travellers were gross exaggerations, and that in learning and virtue the Chinese are little if aught better than any other semi-barbarous people : to laud their institutions is to condemn our own ; and to do this would of course deprive us of the confidence our students at present place in our honesty, sense, and consistency. I mention with some diffidence my disapprobation of the style of many portions of the book ; it contains many deviations from current Oordoo, as I am accustomed to hear it, and many English idioms.

10.—I have perused partially or wholly several original Oordoo and Hindee works,* and some translations from Arabic, Persian, and Sanscrit. I have not found one suited for our use. The ethical works (as the *Ukhlaq Julalee*) are tedious, ill-arranged, and imperfect, and of course contain much false doctrine, physical, political, and moral. The works of imagination are utterly childish in matter, and never inculcate with consistency one noble or liberal sentiment. Their piety is a mere blind submission to Fate ; their charity is a loan on excessive usury ; their generosity reckless profusion ; their wisdom the most paltry cunning. The current Hindee works are of the same complexion ; the only use of such books as the *Rajneet* is that of a drunken Helot among the Spartans.

* *Oordoo.*—Bagh-o-Buhar, Gool-i-Bukaolee, Ukhlaq Julalee, Zoobdut-ool-Khyal.
Hindee.—Prem Sagur, Rajneet, Sutsye.

11.—In short I beg to state that in my opinion all measures for the introduction of a useful Oordoo literature must be taken quite irrespective of that which now exists. I also believe that those measures must emanate from Government, for in matters of education as in all others the people will for a long time to come maintain their habit of sitting down and calling on Hercules. I further take the liberty of remarking that it will be both wise and economical to pay liberally for all such works as reach the standard which Government may please to establish : the time will no doubt come when literary labor will find its market and its pecuniary reward ; but that time is, under present circumstances, indefinitely distant, and every year that the interval can be shortened gives as profit the difference between a year of education and a year of ignorance : the value I will not venture to estimate.

12.—Further, the desire for education is rapidly spreading, and unless the taste of the rising class of readers be at its outset directed into a proper channel, it will most probably fall into an improper one ; and to direct it at first is far easier than to turn it afterwards.

13.—With the science and literature of Europe to draw upon, and with the knowledge that it is from those sources that the educational requirements of India most be supplied, it appears to me that all that is wanting

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is a definite statement of the wishes, the intentions, and the commands of Government.

14.—With regard to the difficulty arising from the poverty of the Oordoo language, and the consequent necessity of borrowing from some other, delay—at least any moderate delay—can bring no advantage; some other language must in any case be drawn from: Government have but to decide what language that shall be.

15.—For scientific terms, I would propose the adoption of those already accepted by all civilized nations. Many Greek words have been transferred into the Arabic, and some thence into the Oordoo; educated natives would generally make no objection to them; and to the uneducated, with whom we are most immediately concerned, a Greek or Latin word is neither worse nor better than an Arabic or Sanscrit one—each equa'ly requiring explanation when first met with. Indeed I cannot imagine any-one proposing to translate all the nomenclature and terminology of the arts and sciences; even were it easy of performance it would in many cases be useless: in chemistry for instance it would establish the misnomer oxygen (I may add hydrogen), and the indefinite names, chlorine, bromine, ammonia, &c. Were hydriodate of potash translated into Arabic or Sanscrit, a Moulvee or Pundit would perceive that the name was composed of words meaning water, purple, a saucepan, and ashes; but he would never be able to select that substance from among several placed before him, for it is a dry white cubical crystallized solid.

16.—For words not purely scientific, resort must I think be had to Arabic and Persian; the advantages of these tongues over Sanscrit are—*first*, that they have already supplied a large number of words now established vernacular; *secondly*, that they are and always have been spoken languages, and have a facility of pronunciation that the latter has not. I confess, however, that my ignorance of all three disqualifies me from saying more on this point.

17.—In conclusion, I beg to state one more subject deserving of consideration—the feasibility of superseding the variety of Oriental characters now used by the Roman character. The plan has been advocated by men of sound sense, and is practised with some success I believe by the missionaries. Its advantages are great:—the distinct separation of words; the divisibility into syllables; the use of capitals and italics; the ease with which minute printing can be read, and the consequent economy; lastly, the peculiarity of a readable running hand. The difficulties are palpable, and need not enumeration; however, Government lately ordered all public officers to learn to read Hindee, and they have done so: the Roman letters do not differ more from the Persian than the Hindee do; they could be learned with equal facility, and I am sure would be, with much more willingness, by the majority of native officials. I will content myself with having said thus much on the subject, which I believe to be one deserving serious consideration.

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XII.—*List of Works in Persian, Urdu, and Hindee, suited by the Principal of the*

No. in the List.	*Name of Work.*	*Language.*	*Author.*	*Where Printed or Lithographed.*
1	Principles of Mahomedan Criminal Law, with the Alterations made in the Law by the Regulations of the Governor-General in Council.	Urdu.	Senior Scholars of the Delhi College. Revised by Moulavi Syed Mahommud.	Delhi.
2	History of the Establishment of the English Power in Bengal,—translated from Mr. Marshman's History of Bengal, with an Introduction and some Notes.	Ditto.	Noor Mahommud, 3rd Urdu Teacher in the Delhi College.	Ditto.
3	History of Rome, abridged,—by Dr. Goldsmith.	Ditto.	Munshi Shivprasad, and revised by Mr. Steward, of the Delhi College.	Ditto.
4	Elements of Trigonometry, Conic Sections, and Analytical Geometry.	Ditto.	Ramchund, Senior Scholar of the Delhi College.	Ditto.
5	History of the Mogul Empire.	Ditto.	Munshi Hoosaini and Noor Mahommud, of the Delhi College.	Ditto.
6	Elements of Practical Geometry, Trigonometry, and Conic Sections, with Trigonometrical Tables.	Ditto.	Pundit Ajoodhyaprasad.	Ditto.
7	Mahommud Azeem's History of Kashmere.	Ditto.	Munshi Ashraf Ali, of the Delhi College.	Ditto.
8	Practical Land-Surveying, 2 Parts.	Ditto.	Hurdeo Singh, Librarian of the Delhi College.	Ditto.
9	Life of Demosthenes.	Ditto.	Pundit Shiva Narayan, of the Delhi College.	Ditto.
10	Hidayak-ul-balaghat, or a Treatise on Rhetoric.	Ditto.	Moulavi Imambux.	Ditto.
11	Abstract of the Mahomedan Law of Inheritance.	Ditto.	Moulavi Syed Mahommud, of the Delhi College.	Ditto.

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for the higher Educational Institutions of the Government, Benares College.

Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Unknown.	Useful for higher classes in colleges. Its style unexceptionable.
Ditto.	Ditto.	Dry enough in the original. The translation pretty good; only occasionally unidiomatical.
Ditto.	Ditto.	A good text-book. The idiom not always clear enough.
Ditto.	Ditto.	Suitable to be used by classes of the middle grade. Style as good as the subject will admit of.
Ditto.	Price Rs. 2.	The style of this work is so difficult as almost to disqualify it for educational purposes.
Ditto.	Unknown.	A useful class-book. The style clear and pure enough.
Ditto.	Ditto.	Hardly suited for instruction. Too poetical and Persianized.
Ditto.	Price 1-8-0.	Should be re-written. It contains very many English words that might well be translated.
Ditto.	Unknown.	Too special in subject for a class-book. Its style, miserable.
Ditto.	Ditto.	A valuable text book. Admirably translated, or rather adapted.
Ditto.	Ditto.	Fit to be used by advanced classes. Style good, though necessarily difficult.

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No. in the List.	Name of Work.	Language.	Author.	Where Printed or Lithographed.
12	The Elements of Political Economy.	Urdu.	Pundit Dhurmnarayan, Senior Scholar of the Delhi College.	Delhi.
13	Origin of the Sikh Power in the Punjab, and Political Life of Maharaja Runjeet Singh, with an account of the present condition, Religion, Laws, and Customs of the Sikh.	Ditto.	Sunker Dass, and revised by Ramchund, of the Delhi College.	Ditto.
14	Elements of Natural Philosophy : 1st. Mechanics ; 2d. Astronomy ; 3d. Hydrostatics ; 6th. Heat ; 7th. Electricity.	Ditto.	Pundit Ajoodhyaprasad and Pundit Dhurmnarayan, of the Delhi College.	Ditto.
15	The History of Persia.	Ditto.	Munshi Hoossini.	Ditto.
16	Life of Alexander the Great.	Ditto.	Pundit Suroopnarayan, of the Delhi College.	Ditto.
17	The History of Abool Feda, from the Creation to A. D. 1328, 1st volume.	Ditto.	Maulavi Kureemooddeen.	Ditto.
18	Ditto ditto, 2d. volume.	Ditto.	Ditto.	Ditto.
19	Cooper's Treatise on Surveying.	Ditto.	James Henry Butler, Assistant Surgeon, E. I. Company's Service.	Ditto.
20	Principles of Legislation, from Bentham and Dumont.	Ditto.	Pundit Ramkishen.	Ditto.
21	Principles of the Differential and Integral Calculus.	Ditto.	Ramchund, Senior Scholar of the Delhi College.	Ditto.
22	Principles of the Laws of Nations, with Historical Illustrations.	Ditto.	Pundit Ramkishen.	Ditto.
23	Marshman's Brief Survey of History, Part I.	Ditto.	Suroopnarayan and Sheonarayan, senior pupils of the Delhi College.	Ditto.

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Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Price Rs. 3.	An excellent class-book. Style easy, but occasionally unidiomatical, from haste.
Ditto.	Unknown.	Hardly needed for schools or colleges. Style generally good.
Ditto.	Ditto.	A bad translation; to be rejected altogether.
Ditto.	Ditto.	Very indifferent, both in matter and style. Too much Anglicised by far.
Ditto.	Price 2-8-0.	Too special in subject for a reading-book. Its style good enough.
Ditto.	Unknown.	Too large and too special for a class-book; but deserves a place in every Urdu library. Style tolerably good.
Ditto.	Price Rs. 9.	*Vide* supra.
Ditto.	Unknown.	Should be re-written. Altogether too much English in it.
Ditto.	Ditto.	Useful for instruction of advanced classes. The idiom might here and there be improved.
Ditto.	Ditto.	Valuable for higher classes. Unfortunately, the translation is not everywhere intelligible.
Ditto.	Ditto.	Of some value as a text-book. The style ordinarily clear enough.
Ditto.	Ditto.	Could easily be improved in the original. The style of the translation is very bad.

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No. in the List.	Name of Work.	Language.	Author.	Where Printed or Lithographed.
24	Marshman's Brief Survey of History Part 2.	Urdu.	Munshi Sheoprasad, and revised by Mr. Steward, Delhi College.	Delhi.
25	Illustrations and complement of Natural Philosophy, from Arnott's Physics.	Ditto.	Pundits Suroopnarayan and Sheonarayan, Senior Scholars of the Delhi College.	Ditto.
26	Elements of Logic.	Ditto.	Senior Scholars of the Delhi College.	Ditto.
27	Principles of Government: 1st., General Principles of Government; 2nd., Principles of the English Government; 3rd and 4th., Principles of the East India Company's Government.	Ditto.	Two Senior Scholars of the Delhi College, and revised by Maulavi Syud Mahommud.	Ditto.
28	Travels in Europe.	Ditto.	Yusuf Khan Kamalposh.	Ditto.
29	Biographical History of Mahomedan Jurisprudence, Theology, and Philosophy.	Ditto.	Maulavi Subhan Buksh, of the Delhi College.	Ditto.
30	History of Greece.	Ditto.	Munshi Wazir Ali and Munshi Sheoprasad.	Ditto.
31	DeMorgan's Principles of Arithmetic.	Ditto.	Hurdeo Singh, Librarian.	Ditto.
32	A Grammar of the Urdu Language.	Ditto.	Maulavi Imam Buksh.	Ditto.
33	The History of Abool Feda, from the Creation to A. D. 1328, Vol. 3rd.	Ditto.	Maulavi Kareemooddeen.	Ditto.
34	History of Maritime and Inland Discovery.	Ditto.	Munshi Sheoprasad, and revised by Mr. Steward, of the Delhi College.	Ditto.
35	History of England, from Pinnock's edition of Goldsmith.	Ditto.	The Native Teachers of the Delhi College.	Ditto.

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Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Unknown.	Could easily be improved in the original. The style of the translation is very bad.
Ditto.	Ditto.	This would serve admirably for a class-book, were it not for its style, which every here and there is obscure in the extreme.
Ditto.	Ditto.	Different persons will differ as to its eligibility as a text-book. Style good enough.
Ditto.	Ditto.	A useful compilation. Style middling.
Ditto.	Ditto.	An amusing work, but not sufficiently instructive for a class-book. Its style is lively, familiar, and elegant.
Ditto.	Ditto.	Curious, but of no practical value. Its style good.
Ditto.	Ditto.	The original well known to everybody. The translation stands in need of a good deal of improvement.
Ditto.	Price 3 8-0.	Well executed in every way. Deserves to be used extensively.
Ditto.	Unknown.	A better grammar than any that has preceded it, and yet susceptible of much improvement. Its style pure and classical.
Ditto.	Price Rs. 4.	See Nos. 17 and 18.
Ditto.	Unknown.	Scarcely needed for a class-book. Its idiom painfully Anglicised.
Ditto.	Ditto.	The English idiom much too closely followed in this translation.

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No. in the List.	*Name of Work.*	*Language.*	*Author.*	*Where Printed or Lithographed.*
36	The History of Mahomedanism, 1845.	Urdu.	Munshi Noor Mahommud, 1st and 2nd; Pundit Ramkishun, 4th and 7th; Pittambur, 5th and 6th—the 5th and 6th revised by Maulavi Syed Mahommud.	Delhi.
37	Abridgment of Royle's (M. D., F. R. S.) Productive Resources of India.	Ditto.	Pundit Ramkishen, Teacher of the Urdu language of the Delhi College.	Ditto.
38	Principles of the Public Revenue. ...	Ditto.	Pundit Ramkishen.	Ditto.
39	Lilavati: A Treatise on Arithmetic.	Ditto.	Syed Mahommud Sahib.	Ditto.
40	An account of India, translated from Murray's Encyclopædia of Geography.	Ditto.	Pundit Suroopnarayan and Pundit Sheonarayan, of the Delhi College, 1848.	Ditto.
41	A Treatise on the Elements of Algebra.	Ditto.	Ramchundur, of the Delhi College.	Ditto.
42	Life of Cicero.	Ditto.	Pundit Motee Lall.	Ditto.
43	Elements of Political Economy,—Mill.	Ditto.	Munshi Wazeer Ali, of the Delhi College, 1844.	Ditto.
44	Elements of Geometry, Books I., II., III., and IV., 1st Part. Ditto, Books V., VI., XI., and XII., 2nd Part.	Ditto.	Maulavi Mumlook Ali.	Ditto.
45	Principles of Hindoo Law, by W. H. Macnaghten, Esq.	Ditto.	Pundit Ramkishen.	Ditto.
46	The first chapter of Herschel's Astronomy; the 12th chapter from Bonnycastle's Astronomy; and the supplement from the Encyclopædia Brittannica.	Ditto.	Pundit Ajoodhyaprasad, Teacher of European Science, Dehlie College.	Ditto.

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Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Unknown.	Hardly needed as a class-book. Its style occasionally bad.
Ditto.	Ditto.	Suitable for native libraries only. Style good enough.
Ditto.	Ditto.	A respectable library-book. Its style good.
Ditto.	Ditto.	However well translated, this work can have no value save as a curiosity. The ordinary clumsiness of its methods alone are sufficiently conclusive against it.
Ditto.	Ditto.	Rather antiquated as an account of India; very unidiomatical.
Ditto.	Ditto.	Too concise. Its style here and there blind.
Ditto.	Ditto.	Fit for a library, but too much Anglicised in style.
Ditto.	Ditto.	Useful for advanced classes. Its style good.
Ditto.	Ditto.	Valuable for Schools and Colleges. The translation very well executed.
Ditto.	Ditto.	Useful, if the subject be any longer studied. Language good.
Ditto.	Ditto.	An admirable work in the English; but the translation of it is in different chapters of very unequal merit.

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No. in the List.	*Name of Work.*	*Language.*	*Author.*	*Where Printed or Lithographed.*
47	Paley's Natural Theology.	Urdu.	Syed Kamaluddin Hyder, under superintendence of Major Wilcox, Lucknow Observatory.	Lucknow.
48	On the Use of the Sector.	Ditto.	Syed Ahmud Khan, Moonsiff of Delhi.	Delhi.
49	Timur's Autobiography.	Ditto.	Maulavi Subhan Buksh, of the Delhi College.	Ditto.
50	Wand's Algebraical Geometry.	Ditto.	Ramchunder, Teacher of European Science, and Radhakishen, Senior Scholar, Delhi College.	Ditto.
51	The Principles of Hydrostatics.	Ditto.	Pundit Ajoodhyapershaud.	Ditto.
52	Leila and Majnun,	Ditto.	Mahommud Hossein.	Ditto.
53	Madhoram's Letter Forms.	Ditto.	Moonshee Syed Mahommud.	Ditto.
54	Thoughts on the Existence of a God.	Ditto.	Pundit Ramkishen.	Ditto.
55	Shumsheer Khanee, or Abstract of the Shahnama.	Ditto.	Munshi Moolchund.	Ditto.
56	Young's Mechanics.	Ditto.	Pundit Radhakishen, 2nd Teacher of English Science, Delhi College.	Ditto.
57	Hutton's Statics and Dynamics.	Ditto.	Ditto.	Ditto.
58	The Ujaebat Rozegar.	Ditto.	Ditto.	Ditto.
59	The Tuzkarat-ool-Kameleen, or Biography of Eminent Persons.	Ditto.	Ditto.	Ditto.
60	Bhoot Niband.	Ditto.	Ramchunder, Teacher of Science in the Oriental Department of the Delhi College.	Ditto.
61	Bahr-i-Hikmat: a description of the Steam Engine.	Ditto.	Translated by Rev. Perkins.	Lucknow.

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Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Unknown.	The style of the transation very creditable.
Ditto.	Ditto.	Useful for higher classes. Its language good enough.
Ditto.	Ditto.	Deserves a place in every Urdu library. The language correct and elegant.
Ditto.	Ditto.	A good class book. Style unexceptionable.
Ditto.	Ditto.	A good class book. Style excellent.
Ditto.	Ditto.	Not suited for a class-book. Well enough translated.
Ditto.	Ditto.	A most valuable translation.
Ditto.	Ditto.	Admirably done, and should be read by all advanced classes in our educational institutions.
Ditto.	Ditto.	Too many Persian words retained for good Urdu.
Ditto.	Ditto.	In every way suited for the use of higher classes.
Ditto.	Ditto.	A valuable class-book. Very well executed in the translation.
Ditto.	Ditto.	Could advantageously be superseded. The style good, however.
Ditto.	Ditto.	Should have a place in native libraries. Well translated.
Ditto.	Ditto.	Should have a place in native libraries. Well translated.
Ditto.	Ditto.	Useful for advanced classes in Natural Philosophy.

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No. in the List.	Name of Work.	Language.	Author.	Where Printed or Litho-graphed.
62	Talim-i-Nafs, or Hints on Improvement of the Mind, abridged from Rev. John Todd by H. C. Tucker, Esq.	Urdu.	Translated by Mr. Fink, for H. C. Tucker, Esq.	Agra.
63	Tarikh Mutaqad-dimin-o-Mutaakh-khirim ki. Ancient and Modern History, Part I.	Ditto.	Rev. J. A. Shurman,	In the Persian character, at Calcutta. Roman, at Allahabad.
64	Hughes' Principles of Geography and Construction of Maps, with Appendix on Physical Geography.	Ditto.	Translated by Munnoo Lal, 1st Native Master, C. E. College, Roorkee.	Agra.
65	Elements of Plane Astronomy.	Ditto.	Translated by Syud Kamal-ood-deen Hyder, at the Observatory of the King of Oude.	Lucknow.
66	Azimgurh Reader, No. II., by H. C. Tucker, Esq.	Ditto.	Translated by Rev. W. Glen.	Mirzapore.
67	An Account, Geographical, Historical, and Statistical, of the Chinese Empire. Two volumes have been published.	Ditto.	Compiled and translated by James Corcoran.	Calcutta.
68	History of India, from the earliest times to the present day.	Ditto.	Translated by the Teachers of the Delhi College.	Delhi.

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Brief notice of Contents.	*In what number, where to be procured, and price.*	*Remarks as to Usefulness of Contents and Excellence of Style.*
Indicated by its title.	Unknown.	Well executed. A good class-book.
Ditto.	Ditto.	A work on a rather extensive scale. The fragment of it published is with some exceptions trustworthy.
Ditto.	Ditto.	As a translation perfectly disgraceful.
Ditto.	Ditto.	A passable translation; but there are better works in Urdu of a similar kind.
Ditto.	Ditto.	Well executed. An excellent reading-book.
Ditto.	Ditto.	Very good as to style, though rather high and flowery. The author's judgment rather fallible. The work, when reduced in price, will deserve a place in Urdu libraries.
Ditto.	Ditto.	Not a good translation, and too unwieldy and ill-digested for a class-book.

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XIII.—*List of Vernacular School-books from Principal of the Agra College.—Agra, the 20th February, 1854.*

No. in the List.	*Name of Work.*	*Language.*	*Author.*	*When Printed.*	*Brief notice of Contents.*	*In what number, where to be procured, and price.*	*Remarks on the Usefulness of Contents and Excellence of Style.*
1	Tawarikh-i-Hind. تواریخ هند	Oordoo.	Mr. Marshman, Editor of the "Friend of India."	1843.	The History of the Hindoo and Mahomedan Powers in India, to the introduction of the Portuguese.	Calcutta School-book Society's Depôt; any quantity; Re. 1-4-0.	It is a useful book, and the style is good; but in some places the translation is too free, conveying a different sentiment to that in the original.
2	Karabadeen. قرابادین یعني فارماکوپیا	Ditto.	The faculty in England; Translation, Calcutta.	1836.	On Medicine, European system.	Calcutta; perhaps Re. 1-8-0.	Is in use in all the Government Dispensaries; but the translation is faulty.
3	Moofeed-ool-Ujsam. مفيدالاجسام	Ditto.	Fuzl Ali.	Hijree 1264.	On diseases, ditto.	Lucknow; in any quantity; Re. 1-0-0.	It is not in general use; the style is good.
4	Rissalah Hait. رسالۂ هیئت	Ditto.	Brinkley; Translation, Lucknow.	1847.	Brinkley's Astronomy.	Lucknow; a few copies only; Rs. 2-0-0.	A very useful book, and the style and translation are both said to be good.
5	Loob-ul-Tawarikh. لب‌التواريخ	Ditto.	A. F. Tytler; Translator, L. DaCosta.	1829.	Elements of General History, Ancient and Modern, in 2 volumes.	Calcutta; price and quantity unknown.	Useful.

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6	Tawarikh Mutaqud-demin-o-Mutaakharin. تواریخ متقدمین	Ditto.	Rev. J. A. Shurman.	1851.	A brief survey of Universal History.	Allahabad; Rs. 1-8-0.	A translation in the Roman character; a useful work.
7	Kahroba-i-Bidulk. کہرباے بالدلک	Ditto.	Moonshee Kureem-ood-deen, Agra College.	1853.	Frictional Electricity.	Agra College; 100 copies; Rs. 1-0-0.	The technical terms are generally those contained in the Glossary to the Oordoo Translation of the Syllabus No. 9. These were adopted by order of the Principal.
8	Kahroba-i-Billums. کہرباے باللمس	Ditto.	Ditto ditto.	1853.	Galvanic Electricity.	Agra College; 100 copies; Re. 1-8-0.	The same remark applies to this work.
9	Miftak-ool-Ooloom. مفتاح العلوم	Ditto.	Mr. Beale and Moonshee Kureem-ood-deen, Agra College.	1852.	Syllabus of Natural Philosophy.	Agra College; in any quantity; Re. 1-0-0.	A very useful book; the translation and style good. Much pains seem to have been bestowed by the Principal of the College on the technical terms, so as to ensure in them exactness of signification; they were partly adopted from Arabic works, published by order of the Egyptian Government, partly constructed from Arabic works, under his direction and superintendence.

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No. in the List.	Name of Work.	Language.	Author.	When Printed.	Brief notice of Contents.	In what number, where to be procured, and price.	Remarks on the Usefulness of Contents and Excellence of Style.
10	Kitab Nuksha Alat-ool-Tubiat. كتاب نقشه آلات الطبيات	Oordoo.	Mr. Beale and Moonshee Kureem-ood-deen, Agra College.	In the Press.	A description of all the apparatus used in the experiments mentioned in the above Syllabus.	Agra College; 100 copies; Re. 1-8-0.	A very useful book; the descriptions accurately and clearly written.
11	Kitab Adath. كتاب آدات	Ditto.	Ditto ditto.	Ditto.	A treatise on Mechanics.	Agra College; in any quantity; 8 annas.	Very useful. Mr. H. S. Reid has approved of the style and translation, it being so made that the simplest mind may comprehend the author.
12	Logarithm. لوگارثم	Ditto.	Azeem Buksh, Student of the Agra College.	1853.	Logarithmic Tables.	Agra College; 100 copies; Rs. 2-0-0.	Useful.
14	Hindee Syllabus. هندي سليبس	Hindee.	Azeem Buksh, Mr. Beale, and Pundit Munnoo Lall, Agra College.	In the Press.	Syllabus of Natural Philosophy.	Agra College, 100 copies; Re. 1-12-0.	Style and translation good; useful.

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No.	Name of the Work.	Language.	Authors.	When Printed.	Brief notice of Contents.
1	Syllabus of Lectures delivered at the Agra College.	English.	J. Middleton, Esq.	1849.	Lectures on Natural Philosophy.
2	Tawarikh-i-Hind.	Oordoo.	Mr. Marshman, Editor of the "Friend of India."	1843.	The History of the Hindoo and Mahomedan portions of the History of India.
3	Kurab-ood-deen.	Ditto.	The Faculty in England; Translation, Calcutta.	1836.	Cu Medicine, European system.
4	Moofeed-ool-Ujsam.	Ditto.	Fuzil Ali.	A. H. 1264.	Ditto ditto.
5	Rissalah Hait.	Ditto.	Brinkley; Translation, Lucknow.	1847.	Brinkley's Astronomy.
6	Loob-ul-Tawarikh.	Ditto.	A. F. Tytler; Translator, Mr. L. DaCosta.	1829.	Elements of General History, Ancient and Modern, in 2 volumes.
7	Tawarikh Mutaqudemin-o-Mootaakharin.	Ditto.	Rev. J. A. Shurman.	1851.	A Brief Survey of Universal History.
8	Kahroba-i-Bidulk.	Ditto.	Moonshee Kureem ood-deen, Agra College.	1853.	Frictional Electricity, Translation of an Arabic Work, from Egypt.
9	Ditto Billums.	Ditto.	Ditto.	1853.	Galvanic ditto ditto.
10	Miftah-ool-Ooloom.	Ditto.	Mr. J. W. Beale and Moonshee Kureem-ood-deen, Agra College.	1852.	Translation of the above Syllabus of Natural Philosophy, by J. Middleton, Esq. (No. 1 of this List)
11	Kitab Nuksha Alat-ool-Tabiat.	Ditto.	Ditto.	1854*.	Descriptions, with illustrations, of all the Apparatus used in the Experiments mentioned in the above Syllabus
12	Kitab Adath.	Ditto.	Ditto.	1854.	A Treatise on Mechanics.
13	Logarithms.	Ditto.	Azeem Buksh, Student of the Agra College.	1853.	Logarithmic Tables.
14	Hindee Syllabus.	Hindee.	Azeem Buksh, Student, Mr. Beale, and Pundit Munnoo Lall, Masters, Agra College.	1854.	Translation into Hindee of Syllabus (No. 1 of this List).

J. MIDDLETON,

Agra College, the 26th April, 1854. * Is expected to be ready by the 15th of May. *Secretary, L. C. P. I.*

Paragraph 7.—"It occurs to us that an interesting collection might be formed of the several works in various languages published by the Government of India for the education of the natives, or for the study of the languages of India; to these might be added any similar works published by Societies or individuals."

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XIV.—*General List of Vernacular School-books,*

Number.	*Name of Book.*	*In what Language.*	*Name of Author.*	*Where Printed.*
1	Meezan-ool-Surf. ميزان الصرف	Persian.	Sadi.	Printed at several places.
2	Moonshaib. منشعب	Ditto.	Ditto.	Ditto ditto.
3	Punj Gunj. پنج گنج	Ditto.	Not known.	Printed at different places.
4	Surf-i-Meer. صرف مير	Ditto.	Synd Shureef.	Lucknow and Dehli.
5	Dustoor-ool-Moobtadi. دستور المبتدي	Ditto.	Safi-ibn-Naseer.	Ditto ditto.
6	Fussool Akbery. فصول اكبري	Ditto.		Lucknow.
7	Nehv Meer. نحو مير	Ditto.	Meer Synd Shureef.	Ditto and Dehli.
8	Ghait-ool-byan. غاية البيان	Ditto.	Abdoor Ruheem.	Calcutta.
9	Soorah. صراح	Ditto.	Abool Fuzl Mohumed.	Ditto.
10	Goolistan. گلستان	Ditto.	Saadee.	Calcutta, Lucknow, and Dehli.
11	Bostan. بوستان	Ditto.	Ditto.	Ditto ditto.
12	Unwar, Soheili. انوار سهيلي	Ditto.	Naseer-oollah.	Calcutta and Lucknow.
13	Zooleikha. زليخا	Ditto.	Abdool Rahman Jamee.	Lucknow, Calcutta, and Dehli.

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by the Principal of the Dehli College.

Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
Grammar of the Arabic language.	One anna; procurable at every large town; but the number procurable is unknown.	Useful to beginners. The style is good.
Ditto ditto.	Two annas; ditto ditto.	Ditto ditto ditto.
Ditto ditto.	Eight annas; procurable at Dehli and Lucknow.	Ditto ditto ditto.
Ditto ditto.	Eight annas; ditto ditto.	Very useful, and the style is excellent.
Ditto ditto.	Eight annas; ditto ditto.	Not very useful; style tolerable.
Grammar of the Arabic language. On account of its being mostly abridged, the book has been very difficult.	One rupee; Lucknow.	Very useful, but for higher grade of students.
Grammár in Arabic.	Four annas; Lucknow and Dehli.	Ditto for beginners.
Ditto ditto.	Four rupees; Calcutta; number unknown.	Most useful for senior students; style is good.
Dictionary.	Sixteen rupees; Calcutta.	Dictionary of Arabic words.
Fables of Morality.	Unknown. From eight annas to two rupees, and can be found where it is printed.	Style is very excellent, and its subject intensely useful.
Ditto ditto.	Ditto ditto ditto.	A very good work, in poetry.
Fables of Morality.	Five rupees, and can be found where printed.	Style is good, and so is its usefulness.
A work in poetry, on the loves of Yusuf and Zuleikha.	One rupee.	Style is not good, and so is its usefulness.

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Number.	*Name of Book.*	*In what Language.*	*Name of Author.*	*Where Printed.*
14	Rooqat Alumgiree. رقعات عالمگيري	Persian.	The Emperor Aurungzeb.	Lucknow, Calcutta, and Dehli.
15	Sikundernamah. سكندرنامه	Ditto.	Nizamee.	Ditto ditto.
16	Ubool Fuzl. ابوالفضل	Ditto.	Ubool Fuzl.	Ditto ditto.
17	Punj Rooqa. پنجرقعه	Ditto.	Noor-ood-deen Zahooree.	Ditto ditto.
18	Meena Bazar. مينابازار	Ditto.	Ditto ditto.	Ditto ditto.
19	Sa Nasr. سه‌نثر	Ditto.	Ditto ditto.	Ditto ditto.
20	Saqee Namah. ساقي نامه	Ditto.	Ditto ditto.	Lucknow.
21	Nul Dumun. نل دمن	Ditto.	Faizee.	Ditto.
22	Musnuvee Ghuneemut. مثنوي غنيمت	Ditto.	Mahomed Ukreem, Punjabee.	Lucknow and Dehli.
23	Dewan Hafiz. ديوان حافظ	Ditto.	Hafiz Shums-ood-deen.	Bombay, Dehli, &c.
24	Tahur Waheed. طاهر وحيد	Ditto.	Mahomed Tahur.	Lucknow.
25	Abdool Wasai. عبدالواسع	Ditto.	Abdool Waseh.	Dehli and Lucknow.
26	Jouhur-ool-Turkeeb. جوهرالتركيب	Ditto.	....	Lucknow.
27	Jwahir-ool-Haroof. جواهرالحروف	Ditto.	Take Chund.	Ditto.
28	Chahar-oon-Sur. چهارعنصر	Ditto.	Abdool Kadir.	Ditto.
29	Zaheer-ool-Afrashee. ظهيراتفراشي	Ditto.	Zaheer-ood-deen.	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
This is like a letter-book.	Eight annas.	Style is good, and likewise its usefulness.
Poetical works, and history of Alexander the Great.	Three rupees.	Style is very excellent, and so its usefulness.
It is like a letter-book.	Two and a half rupees.	Ditto ditto ditto.
Ditto ditto.	Eight annas.	It contains five letters on the subject of love, and the style is very excellent.
Eulogy of nine shops.	Twelve annas.	Ditto ditto ditto.
Do. of the Newab of Beejapoor.	One rupee.	Style is very excellent, but very extravagant.
In verse, ditto.	One rupee.	
On the love of Nul and Dumun, in verse.	Two rupees.	Style is very good, and is useful as to the acquirement of language.
Poetical work on the love of Shahad and Azeez.	Eight annas.	Ditto ditto ditto.
A work on Poetry.	Three rupees.	Style is very excellent, and much useful.
Letter-book.	Two and a half.	Style is good, and so is its usefulness.
Grammar of the Persian language.	Twelve annas.	Style is tolerable, but is useful.
Rhetoric.	One rupee.	Ditto ditto ditto.
A description of the Persian alphabet.	Ditto.	Ditto ditto ditto.
...	One and a quarter.	Style is good, and is very useful.
The eulogy of a garden.	Eight annas.	Style is very excellent and difficult.

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Number.	Name of book.	In what language.	Name of Author.	Where Printed.
30	Nuseer i-Hamadanee. نصير همداني	Persian.	Naseer-ood-deen.	Dehli.
31	Toukiat Kisra. توقيعات كسرى	Ditto.	Julal-ood-deen.	Dehli and Lucknow.
32	Shush Futteh. شش فتح	Ditto.	Julal-ood-deen.	Dehli.
33	Ukhlaq Julalee. اخلاق جلالي	Ditto.	Ditto.	Dehli.
34	Ukhlaq Nasree. اخلاق ناصري	Ditto.	Naseer-ood-deen.	Calcutta.
35	Vekeyeh. وقائع	Ditto.	Neamut Khan.	Lucknow.
36	Tooghra. طغرا	Ditto.	...	Lucknow.
37	Rooqat Bedil. رقعات بيدل	Ditto.	Abdool Qadir.	Ditto.
38	Dewan Nasir Ali. ديوان ناصرعلي	Ditto.	Nasir Ali.	Ditto.
39	Qussaid Urfee. قصائد عرفي	Ditto.	Jamal-ood-deen.	Ditto.
40	Mukhzun-ool-Usrar. مخزن الاسرار	Ditto.	Moulvee Nizamee.	Unknown.
41	Budur Chauch. بدرچاچ	Ditto.	Budderooddeen Chachee.	Lucknow.
42	Tohfat-ool-Irkan. تحفة العراقين	Ditto.	Khaqanee.	Unknown.
43	Qusaid Khaqanee. قصائد خاقاني	Ditto.	Ditto.	Ditto.
44	Qusaid Unwaree. قصائد انوري	Ditto.	Ahud-ood-deen Unwaree.	
45	Burhan Qateh. برهان قاطع	Ditto.	...	Calcutta.
46	Furhung Jehangiree. فرهنگ جهانگيري	Ditto.	...	...
47	Buhar Ujum. بهار عجم	Ditto.	Tek Chund.	Dehli.

Brief notice of Contents.	*In what number and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
It is a letter-book in prose.	Eight annas. ...	Style is very excellent and difficult.
Orders and causes of Kisra.	Twelve annas.	Good, and very useful.
The conquest of Kot Kangra, made by Shah Jahan in six different styles.	Eight annas.	Style is good, and so is its usefulness.
Morality. ...	Two rupees and eight annas.	Style is good, and very useful.
Ditto.	Three rupees.	Ditto ditto ditto.
Description of a battle fought by Aurungzeb, in the Deccan.	One rupee.	Style is good, and difficult.
Different subjects of eulogy.	Two rupees.	Style is very good, and useful.
Letter-book.	One and a quarter rupee.	Style is very difficult; very good, and useful to acquire a knowledge of the language.
A Poetical work.	One and a half rupee.	Style is good and excellent.
Ditto in eulogy of the Prophet and other persons.	One and a half rupee.	Style is very good, and very useful.
...	...	The book is difficult.
...	One rupee.	Poetical work; difficult and good style.
Various subjects.	...	Style very excellent, and so is its usefulness.
Eulogies of different individuals.	...	Ditto ditto ditto.
Ditto ditto.	...	Ditto ditto ditto.
Dictionary of Persian words.	...	Style tolerable, and very useful.
Ditto ditto.	...	Ditto ditto ditto.
Ditto ditto, and idiom.	Twenty rupees; can be found in Delhi as much as 150.	Style is very good and excellent.

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Number.	Name of Book.	In what language.	Name of Author.	Where Printed.
48	Brief Survey of History, Part 1st.	Oordoo.	Pundits Sarup Narain and Dhurm Narain, of Delhi College.	Dehli.
49	Ditto ditto, Part 2nd.	Ditto.	Sheopershad.	Ditto.
50	Mill's Political Economy.	Ditto.	Meer Wazeer Ali, of the Delhi College.	Ditto.
51	Principles of Legislation.	Ditto.	Pundit Ram Kishen, of the Delhi College.	Ditto.
52	Mahomedan Criminal Law.	Ditto.	Students of the 1st English Class, Delhi College.	Ditto.
53	Differential Calculus.	Ditto.	Professor Ram Chundur, of the Delhi College.	Ditto.
54	History of Persia.	Ditto.	Moonshee Hoseinee, of the Dehli College.	Ditto.
55	Emam Buksh's Grammar.	Ditto.	Emam Buksh, of the Dehli College.	Ditto.
56	Hudayuq-ool-Bulaghut.	Ditto.	Emam Buksh, of the Dehli College.	Ditto.
57	Oordoo Idioms.	Ditto.	Neyaz Ali.	...
58	English Grammar in Oordoo.	Ditto.	Pundit Ram Kishen, of the Dehli College.	Ditto.
59	Maritime and Inland discoveries.	Ditto.	Moonshee Sheopershad, of the Dehli College.	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
History.	One rupee and twelve annas; unknown.	Style tolerable; somewhat defective in idiom; not taught for the last three years in the Colleges.
Ditto.	Ditto ditto.	Ditto ditto ditto.
Political Economy.	One rupee and eight annas.	Translation bad; the English seems not to have been understood by the translator; not read for some time.
Law book.	Two rupees and eight annas; unknown.	Translation good; not read for some time.
Ditto.	One rupee; ditto.	Never was made a class-book.
Mathematics.	Four rupees and four annas; ditto.	Has been read in this College for the last twelve years at least. Translation good, but the book is unsuited to the present advanced state of the subject.
History.	One and a half rupee; unknown.	Never made a class-book.
Grammar.	Two rupees; ditto.	Has been read for about six years in this College; a very excellent work.
Rhetoric.	One and a half rupee; ditto.	An excellent translation into the Oordoo, and much read in the city and by students generally.
Idioms.	Six rupees; ditto.	A very good book; but supposed not to be necessary as a class-book: much used by Kayeths.
Grammar.	Ten annas.	Translation good, but never used as a class-book.
History.	Six rupees.	Never read as a class-book. Translation supposed to be defective.

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Number.	Name of Book.	In what language.	Name of Author.	Where Printed.
60	Royle, on the Productive Resources of India.	Ourdoo.	Pundit Ram Kishen, of the Dehli College.	Dehli.
61	Toozuk Teimooree.	Ditto.	Moulvie Soobhan Buksh, of the Dehli College.	Ditto.
62	Mahomedan Law.	Ditto.	Moonshee Hosseinee, of the Dehli College.	Ditto.
63	History of Greece.	Ditto.	Moonshee Sheopershad.	Ditto.
64	On the Use of the Sextant.	Ditto.	Syed Ahmud, Moonsiff.	Ditto.
65	Thoughts on the Existence of God.	Ditto.	Pundit Ram Kishen, of the Dehli College.	Ditto.
66	Assistant Magistrate's Guide.	Ditto.	Moonshee Hosseinee, of the Dehli College.	Ditto.
67	Wayland's Political Economy.	Ditto.	Dhurm Narain, of the Dehli College.	Ditto.
68	Marshman's Revenue Regulations.	Ditto.	Moulvees of the Dehli College—i. e. Moulvees Sobhan Buksh, Emam Bush, Hussun Alee Khan, Syud Mohumed, Khoosh Nuvees, and Ahmud Ali.	Ditto.
69	History of Bengal.	Ditto.	Moonshees Hossani and Noor Mohumed, of the Dehli College.	Ditto.
70	History of Cashmere.	Ditto.	Moonshee Ashruf Ali.	Ditto.

Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
History.	One rupee and eight annas; unknown.	Never read as a class-book.
Ditto.	Nine rupees; ditto.	Ditto ditto ditto.
Law.	One rupee; ditto.	Never read, but perhaps might be read by those who do not understand Arabic.
History.	Four rupees; ditto.	Always read in the College. Translation fair.
Surveying.	One rupee and eight annas; ditto.	Never read, and considered useless.
Metaphysics.	Eight annas; ditto.	Never read as a class-book; might perhaps be made a class-book.
Law.	Two rupees; ditto.	Never read as a class-book, but might be of great utility as a book of reference.
Political Economy.	One rupee and eight annas; ditto.	Translation good, and proposed to be read in the Oriental Department this year.
Law.	Eleven rupees; ditto.	Once read, but is supposed to be a better one.
History.	Eight annas; ditto.	Translation, and is a standing class-book.
Ditto.	Two rupees,	Has been read in the class. Translation good.

Number.	Name of Book.	In what language.	Name of Author.	Where printed.
71	Yusuf Ali Khan's Travels.	Oordoo.	Yusuf Khan.	Dehli.
72	History of the Mogul Dynasty.	Ditto.	Masters Hosseinee and Noor Mohumed.	Ditto.
73	Life of Alexander.	Ditto.	Pundit Saroop Narain, of the Dehli College.	Ditto.
74	Deewan Durd.	Ditto.	Khwaja Meer Durd.	Ditto.
75	Koodooree.	Ditto.	Abool Hussun Bagdadee.	Ditto.
76	DeMorgan's Arithmetic.	Ditto.	Hurdeo Singh, of the Dehli College.	Ditto.
77	History of England, in Nagree.	Ditto.	Pundit Jowahir Lal, of the Agra College.	Ditto.
78	A Treatise on Medicine, in Oordoo.	Ditto.	Master Ram Kishen, of the Dehli College.	Ditto.
79 80 81	Abul Fida, Part 1st. Ditto, Part 2nd. Ditto, Part 3rd.	Ditto.	Moulvee Kurreem-ood-een.	Ditto.
82	Natural Theology.	Ditto.	Syed Kumal-ood-deen, of Lucknow.	Ditto.
83	History of the Arab Poets.	Ditto.	Moulvee Kurreem-ood-deen.	Ditto.
84	Life of Cicero.	Ditto.	Pundit Motee Lall, of Dehli College.	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
Travels.	Two rupees.	Never read as a class-book, but considered a good book for general reading.
History.	One rupee and eight annas.	Read as a class-book. Translation good.
Ditto.	Two rupees and eight annas; unknown.	Never read as a class-book. Translation tolerable.
Poetry.	Eight annas; ditto.	Never read as a class-book; the composition is good, and might perhaps be used as a class-book.
...	One rupee and eight annas; ditto.	The original Arabic. Always read, and considered a very good book.
Mathematics.	One rupee and twelve annas; ditto.	Translation good, and might be used as a class-book by the higher classes of students.
History.	...	Translation bad; unfit for a class-book.
Physics.	One rupee and eight annas; ditto.	Never read, and unfit to be made a class-book.
...	Five rupees, Five rupees, Two rupees, } ditto	Read as a class-book by compulsion. Indifferent.
Theology.	Three rupees; ditto.	Read, but the translation detestable; might be revised and reprinted.
Literature.	Five rupees and eight annas; ditto.	Never read as a class-book; useless for a mere Oordoo scholar, as he cannot understand the Arabic quotations, on which the value of the book depends.
Ditto.	One rupee & twelve annas; unknown.	Never read. Translation deficient.

Number.	Name of Book.	In what Language.	Name of Author.	Where printed.
85	Lives of Philosophers.	Oordoo.	Moulvee Soobhan Buksh, of the Delhi College.	Dehli.
86	Hindustanee Celebrated Poets.	Ditto.	Moulvee Kurreem-ood-deen.	Ditto.
87	Herschell's Astronomy.	Ditto.	Pundit Ajoodhea Pershad, of the Dehli College.	Ditto.
88	History of England, in Oordoo.	Ditto.	By the students of the 1st English class, Dehli College.	Ditto.
89	Geography of India.	Ditto.	Pundits Saroop Narain and Sheo Narain.	Ditto.
90	Land Surveying, parts 1st and 2nd.	Ditto.	Hurdeo Sing.	Ditto.
91	Introduction to Natural Philosophy.	Ditto.	Pundit Ajoodhea Pershad and Master Sheo Pershad.	Ditto.
92	Trigonometry.	Ditto.	Professor Ramchunder, of the Dehli College.	Ditto.
93	Butler's Surgery.	Ditto.	J. H. Butler.	Ditto.
94	Life of Demosthenes.	Ditto.	Pundit Sheo Narain, of the Dehli College.	Ditto.
95	A Treatise on Magnetism.	Ditto.	Unknown.	Delhi.
96	History of Rome.	Ditto.	Moonshee Sheopershad, of the Dehli College.	Ditto.
97	Principles of the Law of Nations.	Ditto.	Pundit Ram Kishen, of the Dehli College.	Ditto.
98	Principles of Government.	Ditto.	...	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
...	Four rupees; ditto.	Never read, but the translation is good.
...	Six rupees; ditto.	Ditto ditto; never taught.
Astronomy.	Two rupees & eight annas; ditto.	Once read; translation good; if the work of '49 were translated it would be better.
History.	Ditto ditto; ditto.	Frequently read; translation good.
Geography.	One rupee and four annas.	Never read, but might perhaps be read.
Surveying.	Twelve annas; unknown.	Frequently read in many Colleges.
Philosophy.	One rupee and eight annas; ditto.	Frequently read in the same, but the translation of the Optics unintelligible.
Mathematics.	Two rupees; ditto,	Always read. Translation good, and until a better work is prepared, should be made a class-book.
...	One rupee and eight annas; ditto.	Never read, and perfectly unintelligible.
History.	One rupee; ditto.	Never read. Translation fair.
Surveying.	One rupee and eight annas; unknown.	Once read. Translation unintelligible.
History.	Three rupees; ditto.	Never read, and all sold. Translation unknown.
Law.	Two rupees and eight annas; ditto.	Once read. Translation very good.
Ditto.	One rupee and eight annas; ditto.	Once read; ditto good.

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Number.	*Name of Book.*	*In what language.*	*Name of Author.*	*Where printed.*
99	Law of Inheritance.	Oordoo.	Moulvee Synd Mohumed.	Dehli.
100	Practical Geometry.	Ditto.	Pundit Ajoodhea Pershad.	Ditto.
101	Lughoo-kaumudi, with its translation. لگھوکومدي लघुकोमुदी	Ditto.	Known, and made at Mirzapore.	Ditto.
102	Algebra.	Ditto.	Moulvee Kurreem Bux.	Ditto.
103	Dewan Souda, ديوان سودا	Ditto.	Mirza Ruffeeoos Souda.	Ditto.
104	Ukhlaq Julalee. اخلاق جلالي	Ditto.	Meer Ummun.	Ditto.
105	Bagh-o-Buhar. باغ و بہار	Ditto.	Meer Ummun.	Ditto.
106	Moofeed Sibyan. مفيدصبيان	Ditto.	...	Dehli.
107	History of Afghanistan.	Ditto.	Pundit Motee Lall.	Ditto.
108	H:dayut-ool-Moobtudee. هدايةالمبتدي	Ditto.	Moonshee Ushruf Ali.	Ditto.
109	Ukhwan-oos Sufa. اخوان الصفا	Ditto.	Moulvee Ikram Ali, of Fort William.	Ditto.
110	Euclid.	Ditto.	Moulvee Mumlook Ali.	Ditto.
111	Gulistan, in Oordoo. گلستان اُردو	Ditto.	Shere Ali Afsos.	Ditto.
112	Tuzkirat-ool-Tumkeen. تذكرةالتمكين	Ditto.	Ramchunder, Professor.	Ditto.
113	Ajaibat Rozgar. عجائبات روزگار	Ditto.	Ditto ditto.	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
Law.	Twelve annas; unknown.	Never read, but might perhaps be read. Translation good.
Mathematics.	One rupee and eight annas; ditto.	Never read here, but read at Roorkee.
Grammar.	Eight annas.	Never read here.
Mathematics.	Five rupees.	The best Oordoo Algebra that was ever printed, and very useful to the higher classes of Mathematics.
Poetry.	...	The language and poetry is very good, and so is its usefulness.
Literature.	One rupee; unknown.	Translation not good; the book is very useful and moral.
Travels.	Twelve annas; ditto.	The language is very good and very useful.
Fables.	Twelve annas; unknown.	Style tolerable, and very useful.
History.	Two rupees; ditto.	Translation is very good, and so is its usefulness.
Alphabet.	Eight annas; ditto.	Very useful to the beginners of Oordoo.
Fables.	Ditto; ditto.	Style very good, and very useful.
Mathematics.	One rupee and eight annas; ditto.	Translation good, and very useful.
Literature.	One rupee; ditto.	Ditto ditto ditto.
Life of the Poets.	Two rupees and eight annas; ditto.	Very useful book.
Various subjects.	Two rupees; ditto.	Ditto ditto ditto.

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Number.	*Name of book.*	*In what language.*	*Name of Author.*	*Where printed.*
114	Bhoot Nihung. بهوت نہنگ	Oordoo.	Ramchunder, Professor.	Dehli.
115	Prem Sagur. پریم ساگر प्रेम सागर	Nagree.	Lulloo Singh.	Ditto.
116	Rajneet. راجنيت राजनीति	Ditto.	Ditto ditto.	Ditto.
117	Baital Pucheesee. بيتال پچيسي बेताल पच्चीसी	Ditto.	Ditto ditto.	Ditto.

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Brief notice of Contents.	*In what number, and where to be procured. Price of the book.*	*Remarks as to Usefulness and Excellence of Style.*
Various Fables.	One rupee; unknown.	Very useful, particularly to eradicate superstition from the minds of the natives.
Tenth Book of Bhagwut.	One rupee and eight annas; ditto.	The style is very good and very useful.
Politics.	One rupee and eight annas; ditto.	Ditto ditto ditto.
Fables.	Eight annas; ditto.	Ditto ditto ditto.

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XV.—*From* J. P. LEDLIE, *Curator, to* C. P. CARMICHAEL, ESQ., *Officiating Assistant Secretary to Government, North-Western Provinces, No.* 395. —*Dated Agra, the 4th March*, 1854.

I HAVE the honour to acknowledge your letter No. 162, dated 18th January, 1854, forwarding copy of a memorandum recorded by His Honor the Lieutenant-Governor, on the 6th idem, as No. 19A., and with reference to the instructions conveyed, I beg to submit the following report:—

2.—All the books compiled, or published, or patronized by the Visitor-General of Schools, are avowedly intended for the Tehseelee Schools, and all, I believe, are used in those institutions. These, then, under the terms of the memorandum, are placed beyond the legitimate range of my enquiries.

3.—There is one book however which I cannot refrain from bringing to the notice of the Committee. I refer to the first four books of Euclid, in Oordoo. This work appears to me to be well worthy of finding a place in the curriculum of the Colleges. In a book of this kind there is little room for the exhibition of style; the translation may be read with fluency, and the meaning be ascertained without pains by a person who understands the grammar of the language. I do not think any other of the publications I have referred to are of a standard high enough to gain its admittance as a class-book in a College.

Dr. Ballantyne's books are expressly intended for the College at Benares; but these are all in the Sanscrit, a language I am totally ignorant of, and I cannot therefore be expected to venture an opinion. Bapu Deva's Algebra, published under the auspices of Dr. Ballantyne, is in the Hindee, of which I have not a very critical knowledge; but as far as my limited acquaintance with the medium and the subject of the book enables me to judge, this treatise might be introduced into the Colleges with advantage.

In the remaining books in the Depository, I can find only one falling within the limits of my report. I speak of Hughes' Principles of Geography, translated by Munnoo Lal, Head Native Master at the Roorkee College. I have tried in several quarters to obtain an English version of the book, that I might with its aid find out the meaning of the translation; but I have failed of success. I am therefore compelled to form my judgment from such glimpses of the meaning as I can catch, and to conjecture the rest.

I am of opinion that Hughes' Principles is a book well suited to our Colleges, but most assuredly not in its present dress. The style is unidiomatic, harsh, and confused. Throughout the book the meaning is enveloped in darkness, and instances of false agreement and false concord meet the reader at every page. If the sense is arrived at at all, it is with intense application and painful research. In consequence of these de-

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fects, a useful book is sealed to the native who has not a previous knowledge of the subject.

The translator has fallen into a common error in endeavouring to transfer to his translation the contents of the English volume nearly word by word, sentence by sentence, in the order in which they appear in the original. This is undoubtedly a good method for teaching a language to a beginner: it furnishes his memory with a vocabulary: it enables him to discover where the idioms of the two languages correspond and where they differ; but a Hamiltonian translation is ill-suited to the conveying of an idea, whether scientific or commonplace. Yet such is the style generally adhered to.

To show that I am not singular in my opinion regarding the translation before me, I beg to submit the criticism of an educated native. It is sent in original, because I am of opinion that grammatical analysis in the Oordoo cannot be translated into English without impairing the force of the argument.

XVI.—*From* A. W. Wollaston, Esq., *to* C. P. Carmichael, Esq., C. S. —*Dated Agra, the* 3rd *February*, 1854.

I have examined the translations of Arnott's Physics and Mill's Political Economy, and beg to submit the following imperfect observations in connection with them:—

It seems to me that there is much to admire in the style and composition of the translation of the former work, executed by Suroop Narain and Sheo Narain, two senior scholars of the Delhi College. Dr. Arnott's work, though it professes to be a popular treatise, abounds with technicalities and treats of such a multitude of subjects as nearly to embrace the whole range of physical science. To translate a work of this kind must under all circumstances be a difficult task: not alone the terms and symbols, but the nomenclature and phraseology peculiar to each branch of the subject, combine to present difficulties to the translator, which a superficial knowledge of Oordoo and Persian will hardly enable a man to overcome. If English and Continental writers thought it necessary to perspicuity and conciseness to borrow terms and phrases—and in some cases, entire nomenclatures—from the Greek and Latin tongues, it is in my humble opinion equally necessary in attempting Oordoo translations of such books to call in the aid of Arabic. Suroop Narain and Sheo Narain evidently felt this necessity and acted accordingly. Much of the excellency of their translation I conceive to be due to the conciseness and precision, and as a consequence the elegance, of the equivalents which they have constructed and supplied for corresponding terms and expressions of the original. And they have consistently adhered throughout the translation to the equivalents adopted at the outset—*e. g.*, the terms gravitation, attraction, and cohesion have been rendered respectively

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كشش ثقل and كشش and كشش إتصال, and whenever these expressions are repeated in the original the same renderings re-appear in the translation. Open the Oordoo work at what page you will, the same fidelity and accuracy of translation will be found. I will here give a few specimens of what I conceive to be very appropriate renderings of corresponding terms of the original treatise :—

Refraction of a ray, ...	إنحراف شعاع
A refracting ray, ...	شعاع منحرف
Reflection from a surface, ...	منعکس هوجانا شعاع کا سطح سے
A luminous body, ...	جسم روشن بالذات
Convex and concave mirrors, ...	شیشه محدب و مجوف
Solid and fluid bodies, ...	اجسام منجمد و سیالی
Moving and quiescent ditto, ...	اجسام متحرک و ساکن
Velocity, ...	مقدار رفتار
Momentum, ...	مقدار صدمه
Inertia, ...	خاصیت عدم ترک
Repulsion, ...	خاصیت مدافعت

And so on: the specimens may be multiplied *ad infinitum.* The style and diction of the translation also, as might be predicted from its excellency in the respect noticed above, are terse and elegant. There are no instances in this translation of a variety of superfluous words employed to express a single idea for which the translator was not sufficient master of the language to furnish a single equivalent. Every sentence of the original has been translated, not paraphrased, and that too with a fidelity and accuracy which an intimate knowledge of the subjects themselves could alone have ensured.

The lithography of the edition published at Delhi might be considerably improved; but as there is not a great demand among the generality of the natives of this country for translations of works on European science, however well executed, the circumstance of the work not reaching a second edition is explained. I cannot but think it well adapted as a text-book for the Oriental departments of Government Colleges; but I fear both the subjects treated of in it and the diction employed by the translator (though in my humble opinion the only appropriate diction) are beyond the compass of mere elementary scholars, such as are likely to be found attending indigenous schools.

As for Wuzeer Ali's translation of Mill's Political Economy I do not *wish* to depreciate it, but will simply add that I cannot admire it. It is a wretched piece of Oordoo.

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XVII.—*From* C. P. CARMICHAEL, ESQ., *to the Secretary to the Committee for Reporting on Vernacular School-books, No.* 1280.—*General Department, Agra, the* 30*th March*, 1855.

I HAVE the honour to acknowledge the receipt of your letter, dated the 19th instant, submitting copies of the notes and memoranda recorded by the several members of your Committee upon Vernacular School-books.

2.—In reply I am directed to express the best thanks of the Lieutenant-Governor to the members of your Committee for the attention which they have given to the subject, and for the information and suggestions contained in their reports.

3.—Your letter with all its enclosures will be printed in an early number of the *Selections*; and the Lieutenant-Governor will bear carefully in mind the opinions which you have recorded in arranging with the Director of Public Instruction as to the patronage to be given by the Government to the preparation of vernacular works, whether of a strictly educational character or as contributions to the growth of a varied and valuable vernacular literature.

4.—The Lieutenant-Governor would look undoubtedly to the greatest degree of acceptance and benefit from original works prepared in the vernacular by native scholars who have had their minds stored and their faculties exercised by a liberal and accurate education in the English language, and in the general literature and knowledge of European nations. But especially in the present stage of progress in the country, he would anticipate also much immediate advantage from the circulation of free and judiciously-adapted translations or compilations on selected subjects; and he will be ready to encourage these as far as really competent agents for the purpose—of whom some few certainly now exist—may from time to time be at command.

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No. 4.

MEMORANDUM ON THE HULKABUNDEE SCHOOLS.

I.—*Memorandum by* MR. H. S. REID *on the Hulkabundee Schools in Pergunnah Kosee, Zillah Muttra. Dated 5th January, 1856.*

I HAVE the honour to submit a memorandum on the Hulkabundee Schools in Pergunnah Kosee, Zillah Mut.ra.

Statement A., herewith submitted, supplies all the detailed information necessary to show the statistics of the schools.

They are 14 in number. They are attended by 790 boys, of whom 492 are the sons or relatives of land-holders, 157 of cultivators, 12 of putwarees, and 129 of non-agriculturalists.

Of the boys included by the tehseeldar under the head of *ghair kashtkar,* many might legitimately be considered to belong to the land-holding class, being the sons of *muhajuns* and *boharas,* who have purchased *puttees* in the villages.

Three of the boys begged me to send them to Roorkee, to study civil engineering. His Honor will remember that Kosee is far removed from the liberalizing influence of communication with Europeans.

A student of the Bukhraree School solved with great neatness, and quickness also, a tolerably stiff quadratic equation proposed by Mr. Tregear.

His Honor's personal inspection of the boys will have given him a far better and more vivid idea of the schools than any amount of mere detail cn paper could effect.

The schools are *chiefly* filled with the children resident in the villages in which they are located. This circumstance may partly be accounted for by the fact that the principal villages were selected when the localities of the schools were determined on.

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It is however satisfactory to observe that not less than 248 boys resident in other villages than those in which the schools are held attend, being on the average 18 per school. The ordinary attendance at indigenous schools does not exceed 10 *(See Statement B)*.

The average attendance per school amounts to 56, and the average salary of the teachers to Rs. 550-11-9. The average cost of each boy's education is somewhat less than one rupee a year; in other words, the annual salaries of the teachers amount to Rs. 780, while the number of scholars is 790.

The day His Honor inspected the schools in the compound of the Kosee Tehseeldaree, upwards of 700 boys were present. I believe that not less than 200 or 250 of that number could solve questions in rule-of-three; that a still larger number could calculate the area of fields.

The boys are instructed in reading and writing the Naguree character. They learn the history and geography of India. In several schools they are reading algebra and geometry. They learn the use of the plain-table, and can in some instances survey and measure land with considerable readiness.

The Hulkabundee system has been introduced also into the Areeng and Sahar Pergunnahs. They contain (17+18=) 35 schools, attended by (391+657=) 1,048 boys, of whom (65+251=) 316 are the children of land-holders, (149+251=) 400 of cultivators, (19+8=) 27 of putwarees, and (158+147=) 305 of the non-agricultural classes. The scholars are not so far advanced as those in Kosee, nor are the schools so largely attended, the average number of boys per school being 23 in Areeng and 365 in Sahar.

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STATEMENT A.

Number.	Name of School.	Date of Establishment.	Name and Caste of Teachers.	Villages in the Circuit. Names.	Distance from School.	Cess.	Father's Profession. Land-holders.	Cultivators.	Putwarees.	Non-Agriculturalists.	Number of boys from each Village.	Total.
1	Phalun, ...	1st May, 1851,	Bindrabun (Brahmin),	Phulen, ...	0	34	31	15	0	9	55	
				Besumbhra, ...	1 coss, ...	12	5	0	1	0	6	
				Mahrowlee, ...	½ coss, ...	10	0	0	0	0	0	
				Burchawalee, ...	1 coss, ...	12	6	1	0	2	9	
				Guhunnah (3 biswas)....	¼ coss, ...	4	0	0	0	0	0	
				Guhunnah (10 biswas),	½ coss, ...	12	13	4	0	1	18	
						84						88
2	Bukhraree,	„	Rada Lall (Brahmin),	Bukhraree, ...	0	24	39	2	1	2	44	
				Khairal (7 biswas), ...	1 coss, ...	12	3	1	0	0	4	
				Roopnuggur,...	1 coss, ...	12	8	3	0	4	15	
				Dhanoutha, ...	1 coss, ...	12	14	3	1	1	19	
				Burka, ...	¾ of a coss,	18	15	5	0	2	22	
				Soojawalee, ...	½ coss, ...	6	8	0	0	0	8	
						84						112

3	Shahpoor, ...	1st May, 1855,	Gungee (Brahmin),	Shahpoor, ...	0	22	10	9	1	23	43	
				Choundrers, ...	¾ of a coss,	8	0	0	0	0	0	
				Ainch, ...	1 coss, ...	13	1	1	0	0	2	
				Choukey, ...	200 paces,	5	0	1	0	0	1	46
						48						
4	Mujhonee, ...	„	Mukhun Lall (Brahmin),	Mujhonee, ...	0	14	15	7	0	0	22	
				Rampoor, ...	¾ of a coss,	6	6	0	0	0	6	
				Burha, ...	½ coss, ...	14	5	0	0	0	5	
				Shazadpoor, ...	¼ of a coss,	12	9	0	0	0	9	
				Sheirnuggur, ...	2 coss, ...	14	8	0	0	0	8	50
						60						
5	Paigaon, ...	1st May, 1851,	Terkha (Brahmin),	Paigaon, ...	0	24	31	13	0	7	51	
				Guhunnah (7 biswahs),	¼ of a coss,	12	0	0	0	0	0	
				Chondouree, ...	¾ of a coss,	12	3	0	0	2	5	56
						48						
6	Khurout, ..	„	Luchmun (Brahmin),	Khurout, ...	0	24	13	2	1	0	16	
				Hussunpoor, Nugla, ...	½ coss, ...	12	4	0	0	0	4	20
						36						
7	Huthana, ...	„	Ramsookh (Brahmin),	Huthana, ...	0	36	17	11	0	1	29	29
						36						
				Carried over, ...			263	78	5	54		401

Number.	Name of School.	Date of Establishment.	Name and Caste of Teachers.	Villages in the Circuit. Names.	Distance from School.	Coss.	Father's Profession. Land-holders.	Cultivators.	Putwarees.	Non-Agriculturalists.	Number of boys from each Village.	Total.
				Brought	forward, ...		263	78	5	54		401
8	Dehgaon, ...	1st May, 1851,	Rambuksh (Brahmin),	Dehgaon, ...	0	24	55	4	0	8	67	
				Kotwon, ...	½ of a coss,	18	10	3	0	5	18	
				Oomrala, ...	¾ of a coss,	6	3	1	0	2	6	
				Nubeepore, ...	1 coss, ...	12	1	1	0	2	4	
						60						95
9	Kamur, ...	"	Beharee Lall (Brahmin),	Kamur, ...	0							
				Soondry and Mondoura, ...	...	36	28	12	1	35	76	
				Lallpore, ...	½ coss, ...	12	0	0	0	0	0	
				Gurhee Burnaree, ...	¾ of a coss, ...	12	0	0	0	0	0	
						60						76
10	Hulwanah, ...	"	Chote Lall (Brahmin),	Hulwanah, ...	0	25	14	8	0	5	27	
				Sirtublah, ...	½ coss, ...	12	8	0	0	1	9	
				Kadouna, ...	¼ coss, ...	11	14	0	0	0	14	
						48						50

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11	Gundvee, ...	1st May, 1855,	Gungolee (Brahmin),	Gundvee, ...	0	24	16	5	0	2	23	
				Kutawala, ...	¾ of a coss,...	12	0	0	0	0	0	
				Rothuree, ...	1 coss,... ...	8	0	0	0	0	0	
				Pukudpoor, ...	1 coss,... ...	8	0	0	0	0	0	
				Poothree, ...	1 coss,... ...	6	0	0	0	0	0	
				Sanchoulee, ...	¾ of a coss,...	12	0	0	0	0	0	
						60						23
12	Buthun Kulan.	1st May, 1851,	Ramjeeth (Brahmin),	Buthen Culan, ...	0	25	17	17	2	10	46	
				Buthen Chotah, ...	200 paces, ...	15	9	8	2	5	19	
				Surwaree, ...	¾ of a coss,...	8	0	0	0	0	0	
						48						65
13	Thomoula, ...	"	Brijnundun (Brahmin),	Thoumola, ...	0	18	19	7	0	0	26	
				Doutana, ...	¾ of a coss,...	12	0	11	1	0	12	
				Azeezpoor,...	¾ of a coss,...	8	8	2	0	0	10	
				Burhana, ...	½ a coss, ...	12	5	1	0	0	6	
				Gounharee, ...	1 coss,... ...	10	2	2	1	0	5	
						60						59
14	Dhum Singh,	"	Radha Lall (Bukal Suraogee),	Dhum Singh, ...	0	17	15	2	0	0	17	
				Julalpoor, ...	¾ of a coss,...	12	0	0	0	0	0	
				Pulwanee, ...	1 coss,... ...	7	0	0	0	0	0	
				Nuggureeah, ...	¾ of a coss,...	12	4	0	0	0	4	21
					Total, ...	48	492	157	12	129		790

STATEMENT B.

NAME OF SCHOOL.	*Number of boys living in the village where a school is situated.*	*Number of boys attending school from villages where there is no school.*
Phalun School, ...	55	33
Bukhraree ditto, ...	44	68
Shahpoor ditto, ...	43	3
Mujhonee ditto, ...	22	28
Paigaon ditto, ...	51	5
Khurout ditto, ...	16	4
Huthana ditto, ...	29	0
Dehgaon ditto, ...	67	28
Kamur ditto, ...	76	0
Hulwana ditto, ...	27	23
Gundvee ditto, ...	28	0
Buthun Kulan ditto, ...	46	19
Thomoula ditto, ...	26	33
Dhum Singh ditto, ...	17	4
Total, ...	542	248

STATEMENT C.

PERGUNNAH.	*No. of Schools.*	*No. of Scholars.*	PROFESSION OF FATHER OR GUARDIAN. *Land-holder.*	*Cultivator.*	*Puhwaree.*	*Non-Agriculturists.*	*Average No. of Boys per School.*
Kosee, ...	14	790	492	157	12	129	56·42
Areeng, ...	17	391	65	149	19	158	23·
Sahar, ...	18	657	251	251	8	147	36·5
Total, ...	49	1,838	808	557	39	434	38·64

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II.—*Note by the Hon'ble the Lieutenant-Governor of the North-Western Provinces.—Dated the 8th January, 1856.*

I HAVE sincere pleasure in placing this statement, which is as accurate as promising, on the records of Government.

I have not seen a more gratifying sight in the Provinces than the collection of above 700 boys and young men who were brought together when I visited Kosee. Their good order and respectable appearance, and the useful elementary training which they were shown to have received, the assemblage of their friends and relatives, and the pleasure and interest which these exhibited in the spectacle, could not but make a deep impression and raise the wish that so beneficial a system of instruction, which really reaches to the agricultural classes in the interior and gives them a knowledge of the greatest value to them, may be rapidly established everywhere throughout the country.

It is particularly to be noticed that three of the lads stated their anxiety to enter the third department at Roorkee, and will be qualified for its tests. It is most desirable to fill the higher schools in this manner from the lower schools in the different parts of the Provinces. It must excite a wide emulation, and the general inter-connection and communication will largely tend to introduce an improved standard of knowledge and feeling among the people in all quarters.

The results here referred to will be specially mentioned in the next annual Educational Report to the Supreme Government, and this memorandum by the Director, Public Instruction, with my present note on it, will be printed in an early number of the Public Selections.

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No. 5.

REPORT ON HULQABUNDEE SCHOOLS IN ZILLAH ETAWAH.

I.—*From* A. O. HUME, ESQ., *Collector of Etawah, to* G. F. HARVEY, ESQ., *Commissioner, 2nd Division, Agra, No. 16.* —*Dated Etawah, the 25th January, 1859.*

I have the honour to submit a brief report in regard to the hulqabundee and other schools of this district.

GENERAL REMARKS.

2.—After these protracted and grievous public troubles, during which the loss of human life and the destruction of property have chiefly engaged our attention, it is pleasing to be able to turn at last from the painful records of treason and its punishment, to those of peace and progress.

3.—Two years ago I submitted a report upon the results of the system of Vernacular Education which I had during the year 1856 introduced into this district: this system even the past revolution failed to obliterate; some of the schools remained open from first to last; and now, though it is but few months since we finally regained possession of the whole district, the schools are once more numbered by hundreds, the scholars by thousands.

4.—A few remarks on the state of education in this district during the past year, and the condition of our schools at its close, will perhaps be useful as a matter of record, and interesting to those who like myself believe that, assert its supremacy as it may at the bayonet's point, a free and civilized Government must look for its stability and permanence to the enlightenment of the people and their moral and intellectual capacity to appreciate its blessings.

5.—Many I fear entirely disapprove of any efforts to cultivate the native mind; many condemn as unconditionally a merely secular education. But on the one hand, history shews us that neither stout heart nor strong arm

will permanently avail a band of alien conquerors, unsupported by the good will of the nation they rule; and on the other, it seems difficult to deny that intellectual culture is one great step towards moral reformation—and moral reformation, the best preparation to conversion.

6.—The experience of the last hundred years has but too clearly proved that, strangers and sojourners in the land as we are, it is only in exceptional cases that we can hope to win the hearts of any of its people. Henceforth we must labour to convince their minds, and secure, if it may not be their affections, at any rate their reason. So, too, experience seems to shew that as yet the nation is not, humanly speaking, able to receive religious training, and meanwhile it seems to me no unprofitable toil to eradicate by secular education the weeds of a debasing superstition, and so prepare the land for that good seed which, in the fulness of its appointed time, shall surely fall from Heaven.

7.—Would that I had to record any marked and important move towards the general diffusion of mental culture. Ours are but small beginnings: the instruction of a few thousand children in the merest rudiments of learning seems in a vast country like this almost too insignificant for notice; but on the one hand, to how many of these may not even this little teaching prove a life-long blessing; and on the other, who can say but what the tiny source now found may not in the far-off future swell into a mighty stream, rolling on ceaselessly and irresistibly into the sea of eternal truth.

General state of the schools at the close of 1856.

8.—At the close of 1856, as noticed in my Educational Report for that year, this district contained:—

1	Central English School, attended by	104 pupils.
181	Hulqabundee Vernacular Schools, attended by ...	5,186 pupils (including 2 girls).

7 Government or Tehseelee Schools, attended by ...	417 pupils, &c.
77 Private Schools, attended by	802 pupils.
Giving a total of	6,509 pupils.

The two former classes alone are under my control, and these I shall therefore first mention.

Hulqabundee Schools.

Improvement in the early part of 1857.

9.—During the early part of 1857 a very marked improvement in the condition of the hulqabundee schools was noticeable: not only did the number of scholars on the 1st of May considerably exceed 7,000, but their attendance became much more regular; and where as usually at least half the children had been absent for two or three days out of every week, I found myself in a position to close the schools for periods of from one to three months against those who, without valid cause, had been absent more than four whole days in any month. Moreover vast numbers of the children's fathers attended at the public examinations (which during March and April, I held throughout the district), and showed the most lively interest in the success or failure of their little ones.

The Mutinies, and their effect upon the schools.

10.—May and June brought the Mutinies, and the consequent relinquishment of the district by the European officers. Government authority was not entirely extinguished, it is true, as through loyal officials and native nobles I succeeded in preserving some sort of order in the district; but crime increased greatly. Men's hearts were troubled, looking for what should come; parents were loath to allow their children to pass out of their sight. Schoolmasters, residents of other districts, had families, whose safety they must needs go to provide for, children and relatives to be fed; and hence, though many remained open for months after my departure, one by one these were closed: and

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when in January, 1858, I returned to the district, I only found 31 schools whose teachers had remained throughout the disturbances at their posts.

11.—For months our hold on the district was precarious in the extreme; but as our position gradually improved, the hulqabundee schools, with very little effort on my part, and without (to say the *least*) a shadow of opposition on the part of any one single person, were re-opened. By July, 1858, all the mainland schools had been re-established; soon after my return in October, those in the Jumna, Chumbul, and Doab, were also re-opened, and by the close of the year all were more or less well attended.

Re-establishment of the schools.

12.—Considerable changes had in the meantime taken place in the district; numerous villages having been received from the Futtehgurh district, while others were transferred to that of Mynpoory,—thus depriving the system of many of its supporters, and bringing us into contact with a number of zemindars who, owing to the manner in which the question had been taken up elsewhere, were hostile to it. The subjoined memorandum sufficiently shews how far the change has affected the educational prospects of Etawah:—

Degree of support afforded by zemindars.

Year.	Number of Mehals.	Number of Mouzahs.	Population.	No. of Mehals whose Zemindars have consented to pay the cess.	Jumma of the cess-paying Mehals.	No. of Mehals whose Zemindars have not consented to pay the cess.	Jumma of Mehals not paying the cess.
1st January, 1857,	1,701	1,495	5,52,727	1,690½	11,50,403	10½	6,323
1st January, 1859,	1,807	1,522	5,39,904	1,713½	11,92,333	93½	39,078

It will be seen that, instead of 10 villages of non-contents, there are now a large number of the lately-transferred

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mouzahs, whose zemindars have not yet agreed to pay the educational cess. Whatever it may have been elsewhere, here the contribution to the School Fund has been purely voluntary; not one petition has ever yet been presented expressing dissatisfaction with the measure, and the most that has ever been done to induce an unwilling zemindar to subscribe has been my telling him personally that his doing so would afford me great pleasure, or my deputing some influential relative, himself a subscriber, to attempt to persuade him. Nevertheless, as time goes on I have little doubt that the greater number of those who at present decline to support the schools will join the good cause, and none the less cordially because not *pressed*, or in *any* way coerced to do so.

13.—In the meantime, of those who do subscribe, certainly not one-fourth (though the number is steadily increasing) cordially and entirely approve the scheme, and personally interest themselves in the schools; about half, though perhaps acknowledging the excellence of education in theory, have no idea of troubling themselves practically about it: they pay the cess, because it costs them little, and because it pleases me and gets them a good name; but they care nothing at all about it, and make no sort of endeavours to induce their tenants to send their children to school, though a fair proportion allow their own to attend when they have nothing else for them to do. One-fourth, or nearly so, are secretly hostile to all education; they utterly disapprove of their cultivators' children being able to read receipts, check accounts, &c. They do not choose to confess it openly, because education has been so much preached up and talked about in this district that most people have begun to consider that, whether they do or not, they ought to consider it a good thing—indeed some of these are openly its warmest advocates, but privately they do all they can to prevent the peasantry availing themselves of the opportunity: they have no objection to their own children being taught, but to

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get up a well-attended school in any of their villages is at present a simple impossibility. This is only what was to be expected; and far from being discouraged by the numbers of my opponents, I derive the greatest consolation from the fact that when, three years ago, I first broached the subject, there was only one zemindar—the late Kour Ajeet Singh, of Pertabneer—really in heart favourable to the project.

Schools and scholars.

14.—And now to compare the number of schools and scholars before and after the disturbances.

	No. of Schools.	No. of Scholars on the School-lists.	No. of Scholars actually present.
On the 1st January, 1857, there were	181	5,186	4,973
On the 1st January, 1859, there were	182	4,734	3,702

Two points are here observable: first, the smaller proportion that the actually present bear to the total number on the school-list; and second, the positive decrease. The first is easily explained: it was during December that Ferozeshah swept through three pergunnahs of the district with fire and sword, and in none of these have the people yet recovered sufficient confidence to trust their children out of their sight. As regards the second, the subjoined classification will show that, though the total number of scholars has decreased, we have really gained ground.

	Scholars less than 10 years of age.	Scholars above 10 years of age.
On the 1st January, 1857, there were	2,519	2,667
On the 1st January, 1859, there were	1,972	2,762

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Thus it is only amongst the *infant* scholars that a decrease has taken place, the natural consequence of disturbances; whereas the number of older boys who can be better trusted to take care of themselves to and from school has actually increased.

Castes and classes to which the scholars belong.

15.—The dominant castes still furnish the greatest number of scholars; but on the whole the numbers from these have decreased, and from the lowest castes have increased, as is shewn below:—

Year.	Kayuth.	Brahmin.	Sonar.	Mahajun.	Carpenter. Iron Smith.	Telee.	Thakoor.	Bunya.	Aheer.	Bhoojee.	Kachee.	Barber.	Bhât.	Lodhee.	Tailor.	Tumolee.	Badree.	Koombar.	Baree.	Koormee.	Kahar.	Mussulman.	
1857,	448	1799	125	315	90	73	892	602	87	55	47	105	5	43	27	7	4	3	23	7	46	188	&c.
1859,	481	1605	163	336	91	64	660	568	88	57	43	93	53	44	25	20	29	17	27	27	26	166	&c.

Thus, though in 1859 the numbers of each caste should be about 9 per cent. less than in 1857, we find that the Thakoors have lost some 26 per cent., while the Kayuths, Sonars, Mahajuns, Bhâts, Tumoles, Koormees, &c., have greatly increased, and none of the low castes, except the Kahars, diminished disproportionally.

Again, as further evidence of the increased readiness of the lower classes to avail themselves of the opportunities thus afforded them, we find that the numbers of sons of cultivators, zemindars, officials, &c., attending the schools in each year were as follows:—

Years	No. of sons of Cultivators.	No. of sons of Zemindars.	No. of sons of Officials.	No. of sons of Artizans.
In 1857,	1,631	1,342	366	873
In 1859,	1,932	758	283	966

It is true that while the scholars from the lower orders have greatly increased, there has been a very considerable decrease in the number of the sons of zemindars and

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Government officials; but it is just these classes who are naturally the most unwilling in these troublous times to allow their children (most of whom habitually wear gold and silver ornaments) to be absent from home. On the whole therefore we may fairly conclude that, notwithstanding all that has occurred in the interim, the schools promise even better than they did two years ago.

Progress of the scholars.

16.—Little can be said in regard to the progress yet made by the scholars of the hulqabundee schools (which are it must be remembered, comparatively speaking, of recent establishment). The boys are kept out of mischief, are taught at any rate from good books, out of which they can learn no harm, but that I fear is all: few at the present time can do more than read and write Hindee with difficulty, and do the *simplest* sums in arithmetic. Many who have been months at school cannot even do that. There *are* boys it is true—but certainly not above 10 per cent. of the scholars—who have learnt to read and write Hindee or Oordoo fluently and well, and who have made considerable progress in mathematics; but these are the exceptions in too many cases. The masters are ill-qualified or inefficient, and too often now parents detain their children at home for weeks at a time to aid them in their labours. Both these sources of obstruction will gradually diminish: the Central Training School at Agra will do much towards raising the standard of qualifications for masters; while wherever boys from any school (as has recently been repeatedly the case) have owing to their attention to their studies obtained good employment, the parents of the neighbourhood have evinced entire willingness to dispense with the services of their children, and allow them to have their chance of success in life. In fact, let the people once clearly see that EDUCATION PAYS, and it will then need no persuasion to induce them to make their sons attend school regularly and diligently.

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Teachers: their general loyalty.

17.—A large proportion of the original teachers returned to their former occupations,—those only for the most part not re-appearing who belonged to distant districts. And here it is worthy of remark that during the height of the rebellion some of my most reliable news-writers were amongst these teachers; and though I have no traces of *some*, I have been able to hear of no *single one* of the whole body joining, aiding, or abetting the rebels. Nay more,—of all the youths in Government employ, educated at Government and Mission colleges and schools, I know of none belonging to this district who ever swerved from their allegiance to our Government. These facts, if true for this district alone, are of little value; but if, as is possible, the same should prove to have been the case elsewhere, their importance cannot be over-rated.

Their castes and age.

18.—Of the teachers, now 185 in number, little more need be said. The two subjoined comparative tables will show that but little change in their age and castes as a body has occurred. As to the former:—

Year.	Between 15 and 20 years of age.	Between 20 and 25 years of age.	Between 25 and 30 years of age.	Above 30 years of age.
In 1857, there were	38	83	31	29
In 1859, ditto	49	76	40	20

As to the latter:—

Year.	Kayut.	Bunya.	Brahmin.	Bhât.	Mussulman.	Mahajun.	Kheytree.	Tailor.	Aheer.	Thakoor.
There were in 1857, ...	95	17	60	0	8	0	0	0	1	0
In 1859, ditto ...	104	13	54	2	7	1	1	1	1	1

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As in 1857, there are still three grades, one receiving 6, another 5, and the 3rd 4 rupees per mensem. There are of these three classes respectively 7, 33, and 145.

19.—Nothing has yet been done towards providing fitting buildings for the several schools; but I hope that before long I shall be in a position to construct suitable houses for the 50 schools in which the daily attendance averages 30 boys and upwards. Our income is at present Rs. 11,923 per annum. The salaries of the teachers, including miscellaneous expenses, may be calculated at Rs. 10,000, leaving a margin of nearly Rs. 2,000 per annum for the construction of school-houses. These, with the assistance that most of the zemindars are willing to give in the way of providing sites, timber, &c., may generally be built for Rs. 100 to 150 each.

School-houses and Funds.

20.—Besides the hulqabundee schools, I established a Central English School in Etawah, which was extremely flourishing when I last reported on it. But unfortunately the Government Educational Department having seen fit to deprive me of my head master, by appointing him Deputy Inspector of the district, and I having been till within the last few days altogether unable to procure another competent person, it has very markedly deteriorated. It contained in January, 1857, 104 scholars, and was all but self-supporting; but in January, 1859, it numbered only 54 pupils, and the total fees paid by them was only Rs. 17-12-0 per mensem, or scarcely one-fourth of the school expenses. Even the pupils who continued to attend forgot, under an inefficient one, much of what they had learnt from a good master.

21.—The Government schools in the district are the same as they were in 1857. They are 7 in number, and have suffered, like all kindred institutions, by the temporary reign of anarchy. However, owing to the praiseworthy

Government or Tehseelee Schools.

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exertions of Pundit Mewa Ram (late head master of the Etawah English School), they now bid fair to prosper as before. Subjoined is a comparative table, exhibiting all necessary facts in regard to these :—

Year.	Number of Government Schools.	Number of Masters.	Salaries of Masters.	Scholars borne on School-lists.	Scholars actually present on 1st January.
1857,	7	14	93	417	401
1859,	7	14	93	350	297

As to the progress made by the boys in these schools, I must candidly admit that it is infinitely greater than in ours. The teachers are better paid, and there is an excellent and well-paid staff to superintend their labours.

22.—In the private schools of the district a very great falling off is observable. In 1857 there were 77 schools, attended by 802 scholars; while in 1859 there are only 49 schools, attended by 409 scholars. I sincerely hope in time to see all these private schools closed: they are under no sort of control, and I have continually found the masters in them teaching mere children from obscene Persian books, without having the grace to omit even the worst passages. Nothing for the most part is taught in them but Persian, and a smattering of Arabic; and after all some of their best scholars grow up able, it is true, to read the Shahnamah fairly, and perhaps the Koran well, but unable to write their native language even decently correctly.

23.—The above is, I feel, but an imperfect and cursory sketch of what has been doing in our educational world during the past two years. It has however one merit—that of fidelity, so far as it goes. It is true that I have rather sought to bring prominently out the two most unfavourable features of the picture—the apathy, or hostility of the majority of the landholders, and the little progress made.

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by the scholars, than to develope the sunnier portion of the view. I might have dwelt more upon the progress that the scheme has certainly made, or on all that has actually been accomplished, or pointed to the many youths who, wholly or entirely educated in these schools, indifferent as they are, who have thereby qualified themselves for and obtained Government employment; but it has always seemed to me wiser and safer rather to heed the obstacles that have yet to be overcome, than those that have been triumphed over; better to toil ever forwards, than to pause and congratulate ourselves on what has been achieved. The goal is still infinitely distant,—and our motto must still be 'Excelsior.'

I have, &c.,
ALLAN HUME.

P. S.—As probably few copies of the same are in existence, I append for reference and comparison my Report for 1856, with the orders of Government thereon.

(COPY.)

II.—*From* A. O. HUME, ESQ., *Collector of Etawah, to* G. F. HARVEY, ESQ., *Commissioner, 2nd Division, Agra,* No. 27.—*Dated Etawah, the* 21*st January,* 1857.

I HAVE the honour to submit a report upon the state and progress of Education in the Etawah district, for the year 1856.

Hulqabundee schools.

2.—In February last I received demi-official permission to attempt the establishment of Elementary Free Schools, to be supported by a voluntary cess, contributed by the landed proprietors. After no little opposition had been overcome by patient argument and perseverance, a large majority of the zemindars of Pergunnah Etawah con-

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sented to the levy of the cess; and they having formally declared the same at a great public meeting held for the purpose, and paid up the first instalment of their subscription, 32 schools were opened on the 1st of April in the more important villages of the pergunnah. These proceedings were then duly reported,* and approved† by the Government and yourself.‡

* Collector to Commissioner, No. 128, 2nd April, 1856.

† Secretary to Government, 280A., 30th April, 1856.
Commissioner to Collector, No. 140, dated 2nd May.

‡ And subsequently by the Court of Directors.

3.—Subsequently, by degrees, the zemindars of other pergunnahs were won over to the good cause, and schools were opened in Phuppoond and Oreyrah on the 1st July, in Beylah on the 15th of the same month, in Beebamow on the 15th of September, in Lucknah on the 1st, and in Rowayn on the 15th of October. Thus in little more than eight months the introduction of the Hulqabundee School System throughout the district was happily accomplished.

4.—At first there were many non-contents in every pergunnah, but when the schools were fairly established, the number rapidly decreased, and the subjoined table, while affording other information, will shew how few zemindars still remain opposed to the system:—

Pergunnahs.	No. of Mehals.	No. of Mouzahs.	Population.	Jumma on 1st January, 1857.	No. of Mehals for which Ekrarnamah have been publicly attested.	Jumma of ditto.	No. of Mehals in which Ekrarnamahs filed not yet attested.	Jumma of ditto.	No. of Mehals in which Ekrarnamahs not filed.	Jumma of ditto.
Etawah, ...	306	285	1,04,585	1,92,894	304½	1,91,559	0	0	1½	1,334
Phuppoond, ...	278	238	76,841	1,85,924	274	1,82,865	2	1,700	2	1,359
Oreyrah, ...	326	295	90,941	1,98,294	322	1,97,016	0	0	4	1,278
Beylah,...	293	249	96,163	2,08,068	292	2,07,916	0	0	1	152
Beebamow (that portion to be retained), ...	79	65	37,203	63,687	77	61,487	0	0	2	2,200
Lucknah, ...	242	192	80,585	1,56,461	242	1,56,461	0	0	0	0
Rowayn, ...	177	171	64,409	1,51,398	176¾	1,50,095	0¼	1,300	0	0
Total, ...	1,701	1,495	5,52,929	11,56,726	1,688¼	11,47,403	2¼	3,000	10½	6,323

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5.—How many of the contributors had really at heart the cause of education, and how many were animated only by a desire of pleasing myself or of escaping from an unpopular minority, it is not easy to determine; but all the ekrarnamahs were, within three months of their being filed, attested either at one of the great public meetings held by the Uncovenanted Deputy Collector and myself at Etawah, Lucknah, Oreyrah, Phuppoond, and Sehar, or in open Court before the Covenanted Deputy Collector.

6.—So short a time has elapsed since the establishment of a large proportion of the schools, that as yet they are by no means so numerously attended as they will be hereafter, while the scholars are for the most part mere beginners. The results however of the past year's labours, such as they are, may be partly gathered from the subjoined table:—

PERGUNNAHS.	Number of Mouzahs.	Number of Schools.	No. of Scholars on the School lists on the 1st January, 1857.	No. of Pupils actually present in the Schools on 1st January.
Etawah, ...	285	32	803	789
Phuppoond, ...	238	26	609	588
Oreyrah, ...	295	32	934	785
Beylah, ...	249	36	1,147	1,118
Beebamow, ...	65	9	247	247
Lucknah, ...	192	23	857	857
Rowayn, ...	171	23	589	589
TOTAL, ...	1,495	181	5,186	4,973

7.—While naturally gratified at these results, I must be careful not to assume to myself the credit that belongs to others. I had several willing assistants,* and one able and zealous coadjutor, to whom I consider that our success has been mainly owing.

* Luchmun Sing, Tehseeldar of Etawah.
Dabee Pershaud, Tehseeldar of Beylah.
Ishree Pershaud, Tehseeldar of Lucknah.

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8.—In my report already referred to, I brought prominently to your notice the kind and cordial assistance which I had received from my valued friend, Koour Ajeet Sing, and the Government in consideration thereof were pleased to direct that he should be presented with a khilut. Unfortunately he lived neither to witness the termination of those labours which he had so materially lightened, nor to enjoy the well-merited honour which was to be conferred on him. Of one of the best and oldest families in the country, he had been for years the guardian and manager of the estates of his nephew (now just of age) the Rajah of Pertabneer, and he left behind him a reputation for ability, liberality, and unblemished integrity, almost without precedent in these provinces. I earnestly recommend that the khilut intended for him should be conferred upon his nephew, as I know he himself would have wished, and that in addition thereto Rs. 1,000 be given to found a scholarship, to be named after him at our Central English and Vernacular School.*

* Vide para. 23, et seq.

9.—I further solicit the issue of khuts to Rajah Koosul Sing, of Chukkernugger, and Rao Jeswunt Rao, of Lucknah; and of perwannahs to Meer Mohib Allee, of Kooneyra, &c., and Chowdhree Maharaj Sing, of Oonchah, &c., expressive of the approbation of Government.

10.—*Schools.*—The geographical situation of the schools is shewn in the accompanying sketch map.* They will no doubt appear to be somewhat irregularly scattered about, but their position is that which experience has hitherto shown to be best calculated to afford instruction to the greatest number of scholars. It is not always the most populous village, nor that most centrically situated, where the most pupils are to be found—caste and character chiefly influencing the number of these.

* The map alluded to is not forthcoming.

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11.—Only three buildings, and these cutcha ones, have yet been erected for the schools. At present these are chiefly located in some commodious apartment of the zemindar (if he is popular), or in some till lately ruined house, repaired after a fashion by the villagers. Nevertheless cleanliness is enjoined and attained, and every school has been furnished with thick tât carpentings, sufficient to accommodate the teacher and all his pupils. During the present and succeeding years it is hoped that neat and permanent buildings will be erected from the surplus School Funds—at any rate for all the large schools.

12.—The average number of pupils at each of the 181 schools is nearly 29, but their general distribution among the latter may be thus best exhibited :—

No. of Schools containing less than 20 Pupils.	Do. Between 20 and 30.	Do. Between 30 and 40.	Do. Between 40 and 50.	Do. Between 50 and 60.	Do. Between 60 and 70.	Do. Between 70 and 90.	Do. Above 100.
47	77	33	14	5	2	2	1

13.—*Teachers.*—There are at present three grades of masters. Of the first grade there are 8, receiving each Rs. 6 per mensem; of the second there are 39, on Rs. 5; while of the lowest grade there are 134, who only receive Rs. 4 a month. Hereafter a few teachers on Rs. 8 or 10 a month for the very large schools will be added.

14.—Of the masters that we have at present many are for the pay they receive very able men; but not a few (the best, though they were, amongst hundreds of candidates) are, owing to the suddenness of the demand, below the mark in attainments or unsuited for the occupation. These are being daily weeded out, and the promotion of two of the ablest men to tehseel itlaknaweesships has certainly improved the class of applicants.

15.—38 of the masters have not yet attained their 20th year, 83 are between 20 and 25, 31 between 25 and 30, and only 29 are above 30 years of age. 34 teach

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Persian, Oordoo, and Nagree, besides arithmetic and surveying with the plane-table; 11 the same, omitting Persian; while 136 have only qualified in Hindee, arithmetic, and surveying. 25 were educated at home, 109 *in the Government schools of this district* (a most gratifying fact), and 47 in the Government schools of other districts. They are chiefly Hindoos; there are Brahmins 60, Bunyahs 17, Kayuts 93, 1 *Aheer*.

16.—It would be out of the question here to enter into a detail of the course of study which has been prescribed, of the rules which have been laid down for guidance of teachers, or of the measures which have been adopted to ensure a strict and constant supervision of them and their charge. Copies of my printed rules in Hindee and Oordoo (which may perhaps be found useful elsewhere) are appended, and to them if necessary reference can be made.

17.—*Pupils.*—Of the 5,186 children on the school-lists on the 1st of January, two only were girls. I wish to consolidate the boys' schools before I attempt to establish any for girls. The ages of the scholars is to me an interesting fact; there were—

Less than 6 years old.	Between 6 and 10 years of age.	Between 10 and 12 years of age.	Between 12 and 14 years of age.	Above 14 years of age.
216	2,303	1,140	816	711

18.—It is curious to observe how far a desire for education is confined at present to particular castes. This will be best illustrated by the subjoined table, showing the number of boys of each of the principal castes, and the total number of inhabitants of that caste in the district.

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Sonar.	Mahajun.	Bunyah.	Tailor.	Brahmin.	Baree.	Bourjee.	Thakoor.	Telee.	Iron Smith.	Naee.	Kayut.	Mussulman.	Kahar.	Kachee.	Lodhee.	Gudherea.	Dhanook.	Chamar.	
No. of Boys in Schools, ...	125	315	602	27	1799	23	55	892	73	90	105	448	188	46	47	43	22	87	1	3
No. of Inhabitants in the District, ...	2655	10002	22326	1089	88845	1142	3248	58800	7206	9511	12610	58336	26849	11130	13671	23837	14083	97315	18017	64606
Percentage of former to latter, ...	·49	·3	·27	·27	·2	·2	·17	·15	·1	·09	·08	·076	·07	·004	·034	·018	·015	·009	·0005	·0004

The above table contains all castes of which there are any considerable number either in the schools or the district.

19.—*Funds.*—The annual income of the Educational Fund is Rs. 11,474, and the appropriations at present

For Teachers' Salaries,...	Rs. 9,348
For 8 Scholarships of 2 Rs. each (*vide* para. 26),	„ 576
To Central School, ...	„ 240
	Rs. 10,164

So that there will remain yearly a surplus of about Rs. 1,300 to be devoted to the construction of school-houses and the purchase of furniture, &c. Thus during the past year nearly Rs. 350 has been expended in the purchase of good tât, from which strong and cleanly carpetings for every school have been prepared. Books (of which many hundred rupees worth have been supplied to the scholars) are in the first instance paid for by the Fund, and are then sold at cost price to the pupils; so that they form in reality no charge upon the Fund.

20.—Hereafter in all probability all schools where, after fair trial and six months' warning to the neighbourhood, 20 pupils cannot be collected, will be abolished, and the salaries of the teachers applied to procure abler masters for some of the very large schools now developing themselves.

Tehseelee schools.

21.—Besides the hulqabundee, there are in the district seven* Government, or as they are commonly called, tehseelee schools. In these there are 9 teachers, drawing a salary of Rs. 74 per mensem. The school-lists on the 1st of January contained the names of 417 boys, and 401 were actually in attendance on that day. Compared with those of the newly-established hulqabundee schools, the attainments of the

* Viz., at Beylah.
Oreyrah.
Juswuntnuggur.
Rowayn.
Phuppoond.
Lucknah.
Etawah.

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tehseelee schoolboys are considerable, although, owing to the fee required from them, the attendance (considering that they are located in far the most populous places in the district) is scant.

In 181 hulqabundee schools, 5,186 boys were taught for Rs. 779, or about Rs. 0-2-5 per boy; while in 7 Government school 417 boys were taught for Rs. 74, or about Rs. 0-2-10: so that as in the latter fees are taken, the education therein given must be considered the cheapest, while it is at present no doubt also the best. However they have been for years at work; we have but just commenced.

Private schools.

22.—Of private schools the district contains 77, the aggregate salary of whose teachers during December was Rs. 303-3-4, being on an average about Rs. 4 per man. The lists of these schools showed 802 scholars, but there were actually present only 675 on the 1st of January. The education imparted at these schools is too generally most objectionable. Persian and even Arabic is taught, and taught well in some of them no doubt, but it is conveyed through the medium of lascivious stories, which a grown and hardened man might well blush to hear. Nearly half of these schools are in Etawah itself; and these at any rate ere long I hope to supersede.

Central English and Vernacular Academy.

23.—Soon after the establishment of the hulqabundee schools commenced, I became sensible of the want of some institution which should serve as a stepping-stone for the scholars of the former to the Agra College, and while it put within the reach of every talented lad, however poor, the attainment of a first-rate education, might tend in a degree to raise the standard of the College. At present it is notorious that first-rate masters are there too generally employed in teaching rudiments, when they should be finishing an education.

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24.—I therefore, on the 1st of August, opened a Central English and Vernacular School, which I intended to be the germ of such an institution as was required. Here too I met much opposition, but ultimately succeeded; and on the 1st of January had 10 students in attendance. These, with one exception, pay fees proportionate to their circumstances in life, as well as for all the books they require.

Paying Rs. 1-8-0 each per mensem.	Paying Rs. 1-0-0 each per mensem.	Paying Rs. 0-12-0 each per mensem.	Paying Rs. 0-8-0 each per mensem.	Paying Rs. 0-4-0 each per mensem.	Free scholar.
2	20	8	47	26	1

25.—The masters consist at present of an able *elève* of the Bareilly College, on Rs. 45 per month, with 10 per cent. on school fees; and 2 others, also in their way capital men, on Rs. 10 and 6 respectively. The total cost is therefore Rs. 61, the income less ten per cent.; Rs. 53 the balance, which of course in former months was larger, being hitherto made good from other sources.

26.—The school established, it yet remained to develope it, and make it available to the poorest boy, if of decided talent and industry. I therefore determined to admit annually into the school 12 free scholars, to be educated as might be necessary for a period of not more than four years. The scholars to be picked lads, 8 from the hulqabundee, tehseelee, and private schools of the Mofussil, and 4 from those of the Sudder. But it was not enough to grant free education to the former: it was necessary to provide for them the means of subsistence while residing apart from their parents, and to this end I appropriated—as I conceive perfectly legitimately—a small portion of the surplus School Funds, so as to allow each scholar from the Mofussil Rs. 2 per mensem.

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27.—I cannot here venture to detail the precautions which have been adopted to ensure the selection of the fittest persons, the inducements that have been held out, or the rules that have been laid down in regard to these scholarships. I append however copies in Hindee and Oordoo of my printed rules on this subject, to which reference can be had.

28.—One step more yet remains—the foundation of scholarships in connection with the Central School, for the maintenance of a few of the best students of the latter during the completion of their education in the Agra College. One such I have recommended in memory of Koour Ajeet Singh; another I would found myself; and there are some native gentlemen whom I have hopes of inducing to do likewise.

29.—The Central School is established; it is nearly self-supporting, but it requires to be greatly strengthened. The school itself contained on the 1st of January 104 boys, paying mostly high fees; the Tehseelee School of Etawah contained 112; while the 29 private schools of the town had 373. There are therefore even now nearly 600 scholars, of whom more than half, young and innocent as they ought to be, are learning all that they ought not* to learn. Surely here are fair grounds for the interference of Government.

* *Vide* para. 22.

30.—After a long conversation on the subject, Lieut. B. Fuller (to whose energetic and persevering performance of his own duties, and kind and cordial assistance to myself, I feel that I could do but scant justice) was of opinion that the present Etawah Tehseelee School might be abolished; that a handsome allowance of say Rs. 200 a month should be made by Government to the Central School, and that the management thereof should as now be left exclusively to myself (if I remain here)—it being always open to the inspection and examination of all qualified Government servants.

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31.—I am particularly anxious on this last point. I have made no endeavour to give you any idea of the immense labour, the perpetual anxiety, that all these arrangements have entailed upon me, because (though I believe that scarcely any one else would have undertaken it in addition to far more than the average of regular business) the work has been to me a pleasure, and not a toil; and now to take away from me my principal school just as it is budding out, and to entrust it to another, who must more or less neglect it (for no one can have that affection for it or take that unflagging interest in it which I have done and still do) would be to me a sad, and I think unmerited disappointment.

32.—A building would of course be required; a splendid site has been already purchased and levelled. The Government have elsewhere given from Rs. 700 to Rs. 1,400 for tehseelee school buildings: surely they will give no less for such a purpose as this. Rs. 5,000 I think I may promise as the contributions of the inhabitants of the district and its well-wishers; while Rs. 2,000 profits of prison labour, that will remain after Rs. 3,000 have been expended in city improvements, may well be expended on an institution which will act so powerfully by eradicating ignorance and alleviating poverty to diminish crime. For about Rs. 20,000 a really handsome and suitable building may it is believed be erected to afford accommodation to the School, the Public Library (now languishing on account of its having no suitable receptacle), and a Museum. The school part, *which may be built first*, will not probably cost more than Rs. 10,000, accommodation being provided for 350 boys, as in England, at the rate of 7 square superficial feet, and not less than 200 cubic feet (the latter will be doubled here) per scholar.

33.—The Government Educational Staff was appointed when schools were almost unknown in the district. Instead of two Pergunnah Visitors there should be at least five,—

one for each of the tehseels under the new arrangements, which (with the 19 schools to be established in Sukutpoor Ayrwah) will give about 40 schools, besides the tehseelee one: and at least 1,200 scholars to each Visitor.

34.—Of course in a brief survey like this I have been compelled to omit innumerable matters of more or less importance. I would willingly have dwelt more, as became its magnitude, on a subject which has so continually engaged my attention, so deeply interested me; but I am aware that even more important matters daily demand the attention of Government and yourself, and shall therefore only add that, during the last fifteen days of December, 1856, out of a total population of 5,52,727, 6,403 boys and 2 girls attended one or other of the schools of the district. This is not much to congratulate ourselves on—*Sed latent meliora.*

I have, &c.,

(Signed) A. O. HUME,

Collector.

END OF VOL. III.

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